THE INDUSTRY'S RECOGNIZED AUTHORITY

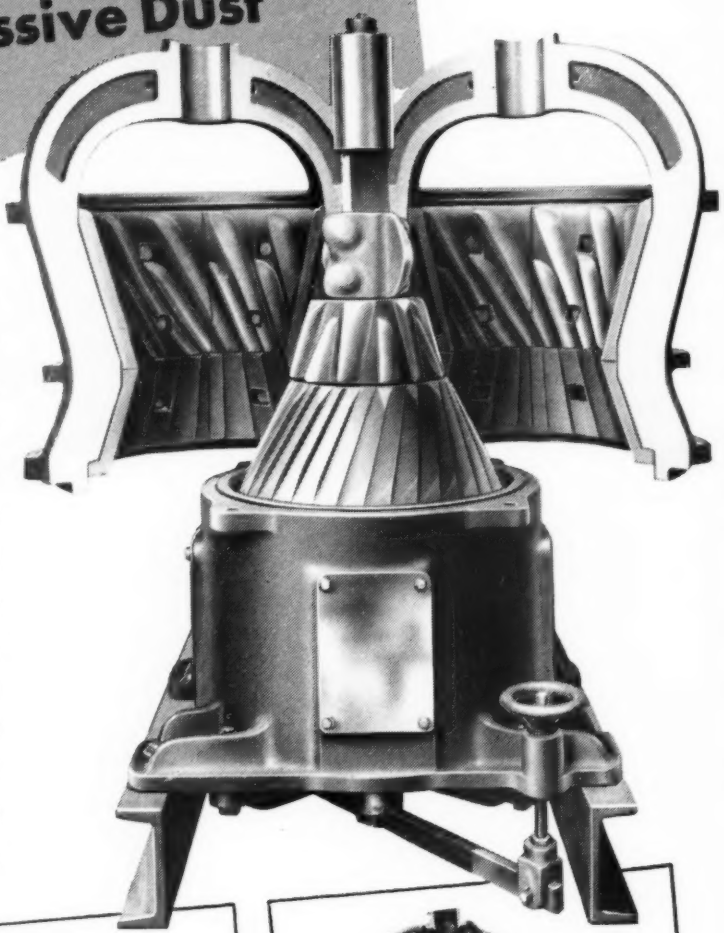
ROCK PRODUCTS

LARGEST NET PAID CIRCULATION IN THE FIELD

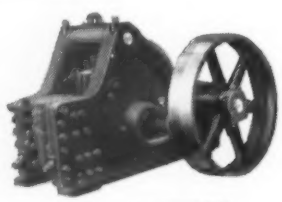
JUNE 1947

ALBUQUERQUE GRAVEL PRODUCTS CO., PLANT, ALBUQUERQUE N. MEX.

STURTEVANT
Rotary Fine Crushers
Provide Granular Products Without Excessive Dust

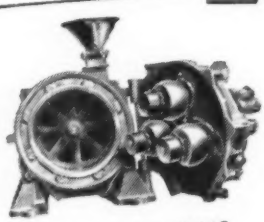


These fast, highly efficient crushers are designed to crush or granulate soft and moderately hard substances to fine even sizes without large amount of dust. They effectively handle materials up to and including the hardness of the softer limestone or cement clinker. The fineness of product is regulated by a hand-wheel. They produce a dependable quality of output from one inch to a quarter inch. Capacity ranges are available from one to 30 tons per hour depending on size of machine. Open door accessibility allows entire crushing area to be exposed for quick, easy cleaning. Write for information.



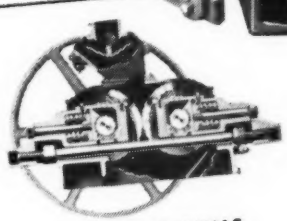
JAW CRUSHERS

for coarse, intermediate and fine reduction of hard or soft substances. Heavy or light duty. Cam and Roller action. Special crushers for Ferro-alloys. Several types, many sizes.



RING-ROLL MILLS

for medium and fine reduction (10 to 200 mesh), hard or soft materials. Very durable, small power. Operate in closed circuit with Screen or Air Separator. Open door accessibility. No scrapers, plows, pushers, or shields.



CRUSHING ROLLS

for granulation, coarse or fine, hard or soft materials. Precision and automatic adjustments. Crushing shocks balanced. For dry or wet reduction. Sizes 8x5 to 38x20. Roller or Plain bearings. The standard for abrasives.

STURTEVANT MILL COMPANY

102 Clayton Street, Boston 22, Mass.

Designers and Manufacturers of

CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS • ELEVATORS • LABORATORY EQUIPMENT • MECHANICAL DENS AND EXCAVATORS • MIXERS

"WE HEAR..."

June 1, 1947

Present indications are that a total expenditure of approximately 19 billion dollars for construction will be made in 1947, according to the Commerce Department. The maintenance figure will be the same as predicted some six months ago but new construction will drop about two billion dollars.

* * * * * * * * * * *

Prices are not expected to return to prewar levels for a number of years because wage levels are expected to remain at abnormal levels, while material prices remain high partly as a result. In the building trades, there is no history of wage cuts, and labor costs in general may be considered as permanently higher.

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Considerable progress is being made toward accelerating road building and several States are planning to increase appropriations. Arizona's construction program will exceed the $25,000,000 budget provided, while in South Carolina the demand for secondary roads has resulted in raising the total to $18,000,000 for the next two fiscal years from the $12,000,000 that had been allocated. Since V-J day, New York State has awarded 141 contracts for construction and rehabilitation of roads.

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An employer cannot refuse to reinstate an employe who leaves to enter the armed forces if he would have been entitled to re-employment rights under the Selective Service Act before that Act expired on March 31. These benefits remain effective until removed by Congress.

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In a case where an employer was in financial difficulties, a court ruling recently permitted a compromise settlement by the employer with his employes, to pay them less than the amount which would be stipulated in an overtime judgment under the Fair Labor Standard Act.

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Division of automotive taxes to other uses in Oklahoma is of such serious proportions that the State faces the loss of federal funds, and its entire highway program is in peril.

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Construction work in New York City was slowly coming to a halt as this issue went to press, because of the strike of 6000 cement mill workers in the northeast which closed 33 cement mills. Large public housing projects involving thousands of dwelling quarters had already shut down 20 days after the strike.

* * * * * * * * * * *

An employer cannot be on safe ground if he discharges an employe at the request of a union holding a closed-shop contract in his plant, because as the end of the contract period was approaching the employe was active in behalf of a competitive union. In a recent decision, reinstatement of employes so involved was ordered.

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A substantial decline in volume of business has been held by a federal district court, in a specific case, as making it unreasonable to make mandatory the reinstatement of veterans in former positions, or in other positions of similar status, seniority and pay.

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WE HEAR

Building rules continue to be relaxed. Construction jobs requiring only negligible amounts of scarce building materials will now be permissible by the National Housing Expenditure, unless the project is clearly unessential.

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Those who must travel a great deal will be interested to learn that fireproof drapery fabrics of asbestos and glass have been developed for use in theaters, nightclubs, trains and other public places of assembly. The asbestos-glass development is an outgrowth of wartime research by United States Rubber Co. Asbestos and glass, when woven together, complement each other to make a fabric of high flexibility and strength.

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Investment commitments for construction in the 37 states east of the Rocky Mountains set a record high first-quarter total of over $1,600,000,000 according to F. W. Dodge Corp. Residential contract letting, to the tune of $748,691,000, was the main factor contributing to the record total.

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The United States consumes approximately one and one-half billion tons of raw materials per year, or 11.5 tons per person.

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Construction on the seven year airport-building program is soon to be started, the Civil Aeronautics Administration having approved the first project authorized under the Federal Airport Act, at Twin Falls, Idaho. Federal expenditure of $500,000,000 is authorized under the program, of which $45,000,000 has been appropriated thus far.

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Said to be Canada's most important mineral find in 20 years, an important source of potash has been discovered 100 miles north of Saskatoon in southern Saskatchewan. Canada has been importing $4,000,000 worth of potash annually at a cost of $40 a ton.

* * * * * * * * * * *

Both Oklahoma and Florida have taken action to build toll roads. A bill has already passed the Oklahoma State Senate authorizing construction of the Oklahoma-Tulsa express toll highway, and the Florida legislature has authorized the State Improvement Commission to borrow money to build "toll" roads. The road department, in Florida, would pay the toll, which in reality would be an annual payment from the gas tax surplus on the books to the credit of the counties. When a road is paid for, it would become a regular State road.

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According to latest available studies, labor production in many industries is on the way up, now that dislocations of reconversion are being straightened out. The increase in productivity is much higher in the manufacturing industries, however, than in mining or construction.

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With all the criticism being levelled at failures in concrete construction of recent date, it is gratifying to learn that the maintenance cost of the Pennsylvania Turnpike, after six years, is extremely low. Despite heavy use, the concrete surface and its concrete structures remain practically untouched, total maintenance cost (based on two lanes) being far less than for the average two-lane, 24-ft. concrete pavement.

* * * * * * * * * * *

Material shortages and the desire to eliminate competition between private business and government for available materials were factors in the 47 per cent reduction in Interior Department appropriations for construction for the fiscal year 1948. The Bureau of Reclamation will have available an estimated total of 85 million dollars in unexpended construction funds and 51 million dollars of unobligated construction funds at the end of the 1947 fiscal year plus 55 million dollars of new funds approved.

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THE EDITORS

★ ★ Editor's Page

Conventions May Be Evaluated In Dollars

HAVING been in attendance at most of the rock products industry's annual conventions these past few months, we have observed increasing evidence of a trend toward the discussional, question and answer type of meetings, which provide an unusual setting for idea interchange. When carefully planned and skillfully conducted, as many of these meetings are, the benefits from attendance and participation become more tangible, as measured by immediate value received. Continuance of this trend, with even more time scheduled for discussion at the expense of formal speeches, will be rewarded by increased membership and acceptance of industry meetings.

The word "convention" is hardly appropriate to identify meetings of the kind to which we refer; they are, in fact, annual industry business meetings, as they have been labeled by one or two Associations in this industry which sought to distinguish their meetings from the mill run of general conventions with which gaiety and night life are commonly associated.

Companies which are members of Associations in the rock products and concrete products industries, and which actively participate in the affairs and meetings of their industry, know that united effort pays richly in dividends when national issues are at stake. They have benefitted in many ways, in a monetary sense too, but so have nonmember companies although they sometimes have failed to recognize that decisions and events of industry-wide implication that benefit them just do not happen automatically.

Operating Sessions

Now, special recognition is being given, in sessions sometimes designated as operating meetings, to problems of plant operation which we strongly endorse. Everyone active in the industry knows the need for maximum output per unit of expense today and in the highly competitive times ahead. Consideration of problems and ideas to accomplish that end constitutes a new service, supplementing the continuing effort on national issues, and paying a special dividend to member companies, individually — those which avail themselves of the opportunity to learn how to operate their plants more efficiently and economically.

Many specific examples could be presented, if space permitted, where ideas carried home from a meeting and put into practice have paid many times over the cost of Association membership. To pick an isolated case in point, immediately following the meeting of the Operating Division, National Lime Association, at Hershey, Penn., last Fall, a large manufacturer of lime claimed that he had picked up one idea that would start to save his company $8000 to $12,000 annually immediately upon adoption. We hear other comments like this on our annual tour of industry conventions.

These meetings are democratically organized, with equal opportunity afforded the small and large producer to bring their problems and present them for floor consideration. Out of the impromptu discussion that usually develops around a given problem, will come one or more practical ideas that stem from operating experience.

Interchange of Ideas

A majority of the really top-flight operating executives attend these sessions and, we have observed, are willing to draw from their fund of knowledge gained over years to answer many of the problems presented in meeting. This is really a high-grade engineering service, founded upon years of practical experience, that becomes available only through personal contact.

A program for meetings, whatever the subject, is not in itself a criterion of the probable benefits to come from attendance. A meeting necessarily is restricted to a few days and, outside of regular sessions, it is up to the individual how much he may learn toward the solution of his problems.

Probably the most productive source of information stems from off-the-record conversation between individuals, sometimes even in the wee small hours of the morning. Men of common interests are brought together, life-long friendships are formed and very often an interchange of visits to plants follows.

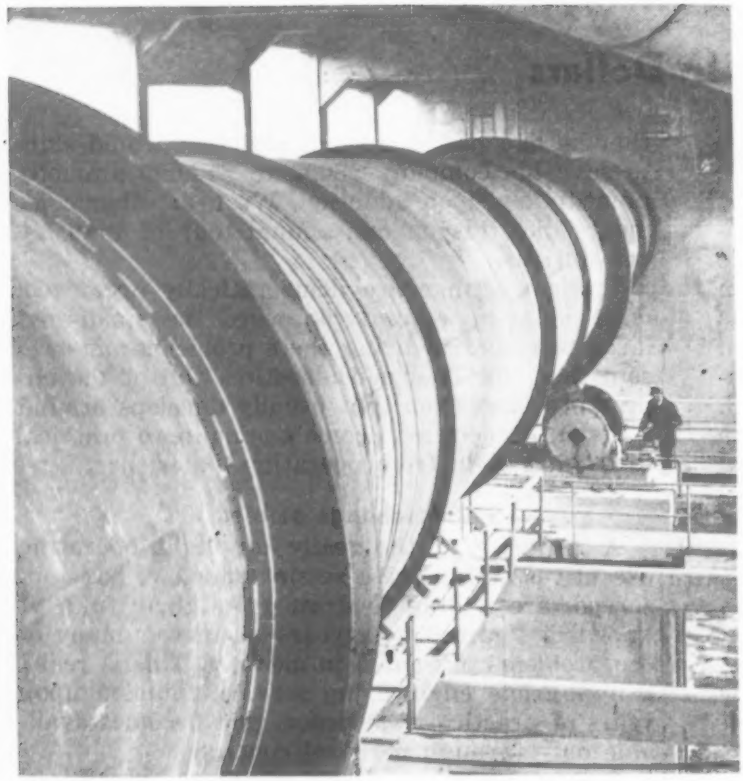
The meetings we refer to do not deal in generalities; they get down into details and the very guts of plant operation and machinery performance. They consider any operating problem presented and, if too involved for completely satisfactory solution within scheduled sessions, more than likely small groups organize after hours to work out the solution.

The specific details of discussion therefore are often not for the record and cannot be made available, at least in their entirety, except by active participation in meetings such as these. Greater participation in industry organizations, and in their meetings, is desirable in order to attain wider interchange of ideas for the good of the industry and the selfish interests of individual companies as well.

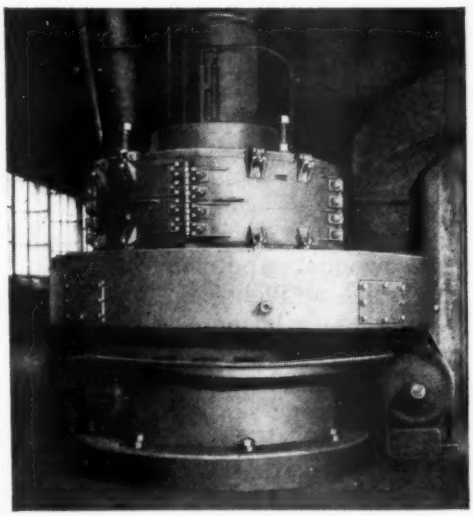
Bror Nordberg

B&W Direct-Firing System

Proves Big Advantages on America's Biggest Kiln



Kiln at Marquette Cement Mfg. Company's Hawkeye Plant at Des Moines, Iowa



This B&W Type E Pulverizer, rated at 18,000 lb. of coal per hr., serves America's biggest rotary kiln

FOR five years now at a Mid-Western wet process cement plant, a 475-ft. rotary kiln — largest in America — has been efficiently and economically fired by a B&W Type E Pulverizer. Because of the many cost-saving advantages combined in this firing system, it has been — and still is — a big factor in keeping production costs in this plant at a low level. For instance, "excellent fuel economy" is being obtained, even when firing low-grade coals. At many other cement plants, too, the B&W Direct-Firing System has been the means of effecting worthwhile operating and maintenance economies while improving product quality. In some cases a two-thirds saving over former firing methods has been reported.

C-77

FOR CEMENT PLANTS — Pulverized-Coal Direct-Firing System . . . Pulverizers for Grinding Rock Products and Ores . . . Heat and Abrasion Resistant Alloy Castings . . . Stationary Boilers and Component Equipment . . . Waste-Heat Boilers . . . Fuel Burning Equipment . . . Refractories . . . Seamless & Welded Tubes.

★ ★ ★

OTHER B&W PRODUCTS — Marine Boilers . . . Pressure Vessels . . . Special Process Equipment . . . Chemical Recovery Units.

BABCOCK & WILCOX

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Rocky's NOTES

Nathan C. Rockwood

Looking Ahead!

AFTER FORTY YEARS reporting industrial progress, one may be expected to reminisce rather than look ahead ten or fifteen years, yet we find it difficult to get in a reminiscent mood in the fast-moving present. Consequently, we read with interest the *Business Week's* summary of the 875-page report of The Twentieth Century Fund, a privately endowed research organization, on what to expect in the decade 1950 to 1960.* The summary itself takes 16 pp., so probably many subscribers of that magazine will be "too busy" to give it the thoughtful reading it deserves. Anyhow, we are going to abstract a few of the high points here—and inject a few comments of our own.

Families Are Multiplying

The population of the United States is expected to increase 12,000,000 in the present decade 1940-1950, and 10,000,000 more in the following decade 1950-1960. Moreover, there has been and is a post-war boom in marriages, so that the number of families is increasing at a faster rate than population. The population is getting older, too, because of advances in medical science which keep oldsters alive longer; and oldsters are family people. The trend toward urbanization will continue, but smaller cities will gain population faster than big cities. More young people will go to high school and college. Work weeks will be down to 38 hours by 1960.

Taking into account the shorter work weeks and longer vacations, it is estimated that 121 billion man-hours will be worked in 1950 and 118 billion in 1960. This compares with 105 billion in 1940 and 154 billion at the height of the war effort. Man-hours account for less and less production as strides are made in the application of mechanical energy. In 1900 the total energy output of the U. S. in billions of horsepower was 82.9, of which 38 per cent was mechanical energy, 10 per cent was human, and 52 per cent was animal energy (really horsepower, then). In 1940, the total energy was 289.4 billion horsepower, of which 4 per cent was human and 6 per cent animal energy. By 1960, assuming 489.8 horsepower, only 2 per cent of the energy will be human and 2 per cent animal.

*April 26, 1947 issue of *Business Week;* a reprint is available for those who can use it —EDITOR.

Production per Man-Hour Is What Counts

The 20th Century Fund researchers remind us it is substitution of mechanical energy for human energy that accounts for the rapid advance in American living standards. In terms of 1944 dollars (since in this instance, money values have to be the same) the average product output per man-hour was worth $1.22 in 1940, and is expected to be worth $1.70 in 1960. Since electrical energy at about 1¢ per horsepower is the equivalent of human energy at about $10, it is readily appreciated what the substitution of mechanical energy for human energy has meant in terms of lower cost of producing goods and services.

It appears that the development of the rock products industry, with which we are all familiar, has followed closely the pattern of progress in all American industry. When demand begins to show signs of catching up with productive capacity, there is rapid development of new plants and rehabilitation of old ones with new machinery and improved processing. Then things slow down again until it is time for another cycle. This, the researchers conclude, is a natural result of a free competitive society, and there is seldom, if ever, any real lack of productive capacity in industry.

Middle Income Earners Best Off

Of a total of individual incomes in 1950 of $135 billion, those in the $2000 to $5000 per annum group are expected to get $62.1 billion, or 47 per cent of the total, whereas in 1935-36, they got $23.8 billions of a total of $85 billion. That was 28 per cent. The difference comes from a larger number as well as wage increases, because the under $1000 per annum group that got 20 per cent of the total income in 1935-36 will get less than 6 per cent in 1950—that group is vanishing. The $5000 plus group will get about a 12 per cent larger share of the national income than in 1935-36. These changes in the relative incomes of the two large groups, together with urban concentration, is interpreted to mean more emphasis on the purchase of household and mechanical equipment, automobiles, transportation and vacation expenditures, than on housing, food and clothing, although the average person will fare better in these than at present, because of his larger income.

The chief fly in the ointment seems to be a prospective shortage in some basic raw materials, which were so freely contributed to the war effort and can be overcome only by use of substitutes or by importations. Hence, if foreign governments prove fairly stable, our investments abroad may reach $25 billion by 1960. This, of course, relates to investments by private enterprise; our federal government, having already "invested" about four times that amount abroad.

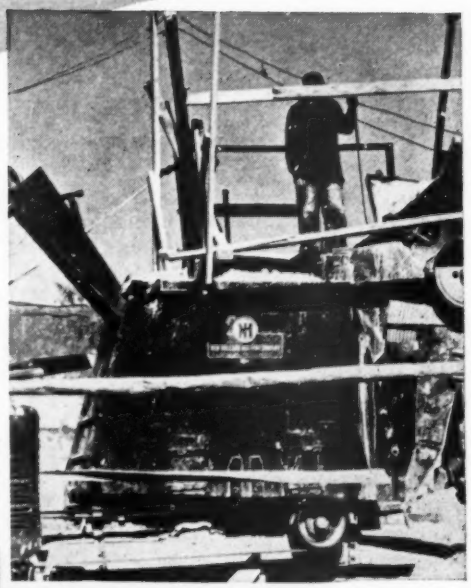
The 20th Century Fund researchers look for more emphasis on the installation of new and improved equipment to increase productive capacities and lower costs, rather than on construction of new productive facilities. This seems verified in our own rock products industries, which came out of the 1930's depression with more than ample over-all capacity.

In this summary of expectations for the decade 1950 to 1960, which is based on our collective ability to maintain business on an even keel, with relatively full and continuous employment, we see nothing but cause for optimism on the part of producers and manufacturers in the rock products industries. The demand for automobiles and for travel will ensure demand for a huge highway building and maintenance program, and public works in nearly all our older cities are badly in need of reconstruction, especially with the prospect of growing populations.

From the angle of producers already in the field, the situation is particularly favorable, for obviously it will be easier to acquire capital for new equipment and plant expansion than for a new corporation to acquire capital for new plants. In the first case the capital, or a large part of it, probably will come from savings in the corporation's earnings, while in the latter case the promoter will have to sell many small investors on parting with their savings for the prospect of a very modest return, even under the most favorable conditions. With the greatly increased cost of construction of new plants, the reproduction cost of the older ones becomes much greater; which is another way of saying that depreciated money has raised the dollar investment value of good, serviceable existing plants to at least 50 to 75 per cent of the cost of a new plant.

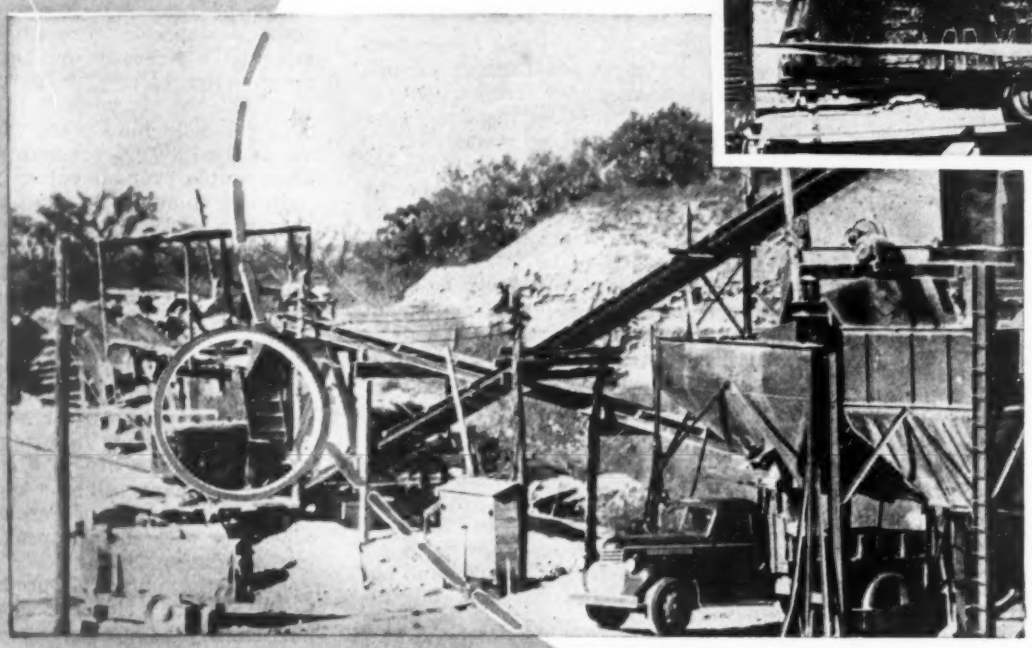
A DUAL IMPACT ACTION FACT

MAINTENANCE COSTS DOWN 25c PER TON...



The machine: New Holland Double Impeller Breaker... The place: Dillon, Sharpe & Co., Columbus Junction, Iowa ... The production record:

"... well over 150,000 tons of quarry run material with this single Breaker and maintenance is practically nil. Previous conventional equipment incurred a wear factor of 28 cents per ton. Under identical conditions, we now operate the New Holland Breaker with a wear factor of 3½ cents per ton." Signed: W. F. Sharpe.



It's a power saver, too. High fines production is demanded in this Iowa quarry ... that means stepping up impeller speeds. Even at 1000 r.p.m. these finely balanced impellers used only 80 h.p. each ... producing 100% aggregate passing 1" screens, 65% passing eight mesh.

Simple Breaker adjustments give you any size aggregate you want ... from ag lime to road ballast. For complete details, write Dept. T-5, New Holland Manufacturing Company, Mountville, Pa.

NEW HOLLAND
DOUBLE IMPELLER BREAKERS

PRIMARY AND SECONDARY CRUSHING IN ONE OPERATION

the *Personal Side* of the news

Appointed Sales Manager

FRANK J. WHITMAN, assistant sales manager, Universal Atlas Cement Co., Chicago, Ill., has been appointed sales manager to succeed EDWARD QUEBBEMAN who has retired after 51

Frank J. Whitman

years of continuous service with the company. Mr. Whitman was born in St. Louis, Mo., attended Notre Dame University, graduated from De LaSalle Institute, Chicago, Ill., and joined the Universal Atlas Company as a clerk in accounting in 1918. Three years later he transferred to sales work where he served as field representative and as sales correspondent and since 1938 as assistant sales manager for Wisconsin, Michigan, Indiana and Illinois.

Mr. Quebbeman began work with the company as an office boy in the St. Louis office of what was then the cement department of the Illinois Steel Co. Subsequently he became junior clerk, salesman and division sales manager. Since 1928 he has been sales manager for Indiana, Michigan, Wisconsin and Illinois except Metropolitan Chicago. He witnessed the origin of concrete roads and was active in the development of the cement industry and with the growth of the Universal Atlas Cement Company to its present high capacity.

Made Director

P. G. FORMAN, operating vice-president of the Industrial Silica Corp., Youngstown, Ohio, was elected a director of the company at the recent annual meeting. He succeeds Chess Lamberton who has resigned because of ill health. All other directors were reelected. They are Thomas H. Bascom, Jr., Joseph G. Butler, Jacob S. Coxey, Jr., Ben S. Naven, R. J. Ranev, Ralph E. Roscoe and Myron E. Ullman. Directors at the meeting reelected all officers. They are R. J. Raney, chairman of the board; Jacob S. Coxey, Jr., vice-chairman and president; P. G. Forman, operating vice-president; A. C. Lemke, secretary and treasurer; C. F. Eberhart, assistant secretary; and E. R. Wetter, assistant treasurer.

Lehigh News

ARTHUR I. DEHUFF, who has been plant manager of the Metaline Falls, Wash., plant of the Lehigh Portland Cement Co. since 1940, has retired, and A. W. SCHAEFFER, chemist at the Alsen, N. Y., plant, has been appointed to succeed him. Mr. DeHuff became associated with the Metaline Falls plant in 1909 when it was being built by the Inland Portland Cement Co. He later became successively chemist, chief clerk and chemist, and supervising chemist and engineer. For the immediate future, he intends to rest and to enjoy some of the natural advantages of the Northwest.

ALLEN H. UHLER has been appointed chemist at the Alsen plant, succeeding Mr. Schaeffer. He has been assistant chemist at the plant since his return from military service. During the war, he served as a meteorologist with the rank of First Lieutenant and was stationed for some time at Ladd Field, Alaska.

GEORGE W. HANNAMAN has been promoted to assistant plant manager of the Mason City, Iowa, plant. Prior to that time, he had been plant engineer except for nearly five years of military Service. Entering the Army as a 2nd Lieutenant in the Engineer Corps, he advanced to the rank of Lieutenant Colonel and his service abroad included England and action in France, Belgium, Luxemburg and Germany with the 308th Engineers, 83rd Division.

Executive Vice-President

THORKILD AVNSOE, vice-president in charge of operations of the Lone Star Cement Corp. New York, N, Y., has been elected executive vice-president by the board of directors. Mr. Avnsoe has been with the company since 1912 and vice-president in charge of operations since 1929.

Returns to China

C. Y. TANK, one of the Chinese cement experts sent to this country to learn our methods of manufacturing cement, returned recently to Shanghai, on his way to Chinghing, China.

Heads Pipe Firm

THOMAS E. ARP is president and treasurer of the Sherman Concrete Pipe Co., Inc., Johnson City, Tenn., recently incorporated with an authorized capital of $100,000. I. W. "IKE" GREENE is vice-president and secretary.

Association President

L. W. HAYES, of Bethany and Kansas City, Mo., who operates two limestone quarries in Bethany, has been elected president of the newly organized Missouri Limestone Producers' Association, which has been formed to promote the use of agricultural limestone throughout the State of Missouri. PAUL N. DOLL, who has resigned as agricultural engineer with the State Division of Resources and Development, is manager of the association, with headquarters in Jefferson City, Mo.

Retires

H. E. KERBY, general purchasing agent of the Lone Star Cement Corp., New York, N. Y., has retired after more than 25 years of service. He joined the company in 1921 as chief clerk at Hudson, N. Y., and in 1926 entered the sales department. Three years later he was appointed assistant manager for the company in Uruguay. Mr. Kerby returned to this country in 1932 as sales manager of the Pennsylvania division, and in 1935 was appointed general purchasing agent with headquarters in New York City. After his retirement he will reside in Independence, Iowa.

Foreman's Club Speaker

FRANK MOYLE, director of operations, Marquette Cement Mfg. Co., Chicago, Ill., was the main speaker at a recent meeting of the Foreman's Club in Cape Girardeau, Mo. In his talk, Mr. Moyle discussed the relations of the foremen and their men. Souvenirs of the Marquette Cement Mfg. Co. were distributed at the meeting.

Named Vice-President

CYRIL P. PESEK, administrator of engineering for the Minnesota Mining and Manufacturing Co., St. Paul, Minn., was elected a vice-president of the firm at a recent meeting of the board of directors. All other officers and directors were reelected. Mr. Pesek was formerly associated with Glynne W. Shifflet in the architectural firm of Pesek & Shifflet.

Heads Mines Division

DR. OLAF P. JENKINS, chief geologist of the California Division of Mines since 1929, has been appointed chief of the Division of Mines, succeeding W. W. Bradley who for many years was State Mineralogist and has now retired.

Joins Gypsum Firm

EVERETT A. FAIRLAMB has joined the industrial sales division of the National Gypsum Co., Buffalo, N. Y. He will act as industrial sales engineer and wil develop new products and new sales outlets. Mr. Fairlamb graduated from the Virginia Polytechnic Institute in business administration. During his three years of service with the 8th Air Force, he held the rank of First Lieutenant and served as navigator on a B-17 through 35 combat missions in the European theater of operations.

Everett A. Fairlamb

Awarded Plaque

HERMAN D. RUHM, vice-president and founder of the Ruhm Phosphate and Chemical Co., Columbia, Tenn., was honored recently by the Columbia and the Mt. Pleasant Rotary Clubs, along with members of the phosphate company, at a luncheon held at the Wayside Inn. The luncheon was dedicated as Herman D. Ruhm Day. Mr. Ruhm was presented with a gold-embossed plaque, commemorating his 50 years of service with the company, which was formed by Mr. Ruhm and his brother, the late John Ruhm, in 1897, and is the largest producer of ground phosphate rock for direct application to the soil in the world. Oliver M. Babcock, Jr., of Chicago, president of the company, Gordon H. Rosberg, secretary, and Ronald S. Morrison, general manager of the Hoover and Mason Phosphate Co., Mt. Pleasant, Tenn., an affiliated company, and other officials were at the presentation which was conducted by E. W. Rusk, supervisor of salesmen for the firm. J. B. Fawcett, president of the Rotary Club, presided at the festivities which came as a surprise to Mr. Ruhm, who has a record of not having missed a Rotary meeting for more than 20 years.

Sales Representative

GEORGE E. HENRY, JR., has been appointed sales representative in eastern Arkansas for the Marquette Cement Manufacturing Co., Chicago, Ill. He was formerly associated with his father, G. E. Henry, in the Henry Builders Supply Co., Walnut Ridge, Ark.

Promoted

RICHARD M. GLAZIER, formerly manager of the order department, has been promoted to the position of assistant manager of gypsum and building lime sales, National Gypsum Co., Buffalo, N. Y.

Sales Manager

CHESTER A. BROOKS, formerly sales manager for the Monarch Cement Co., Humboldt, Kans., has been appointed sales manager of the Humboldt Brick and Tile Co., Humboldt, Kans.

Rotary Club Director

RUSSELL RAREY, vice-president of The Marble Cliff Quarries Co., Columbus, Ohio, has been appointed a director of the Columbus Rotary Club for the coming year.

Named Secretary-Treasurer

A. BRENZIGER has succeeded A. A. Hermes as secretary and treasurer of the Kentucky Rock Asphalt Co., Inc.

OBITUARIES

IRVING F. SISSON, director of sales, Signal Mountain Portland Cement Division of the General Portland Cement Co., Chattanooga, Tenn., died recently after a brief illness. He was 48 years old. Mr. Sisson had been active in the sales efforts of the company for 19 years and was well known in the building construction industry in the Southeast.

BRUCE SHOTTON, manager of the Pittsburgh office of the Hendrick Mfg. Co., New York, N. Y., was killed by an automobile at Marietta, Ohio, the night of April 10. He had stopped overnight there on a trip to West Virginia. Mr. Shotton was chairman of the manufacturers' division of the American Mining Congress, and active in the National Crushed Stone Association.

T. D. SPEARS, a partner in the firm of Columbia Rock Products Corp., Columbia, Tenn., died recently on an Illinois Central passenger train between Chicago and Evansville, Ind. He was returning home from Boise, Idaho, where he had been called on account of the serious illness of a sister.

CHESTER C. MARTIN, who retired January 1, 1947 as manager of the Minneapolis Office of the Dewey Portland Cement Co., Kansas City, Mo., died recently in Palm Beach, Fla. He was at one time president of the former Flaxlinum Co., insulation manufacturing firm in St. Paul.

JOSHUA A. SAWYER, manager of the asphalt department of the Shell Oil Co., New York, N. Y., and a director and vice-president of The Asphalt Institute, passed away on April 6. Born in Colorado, educated at Colorado School of Mines, Mr. Sawyer engaged first in railroad and mining and then in highway construction work, the latter as a division engineer with the Oregon State Highway Department. He left this work to form an asphalt department for Shell Oil Co. on the Pacific Coast.

Gypsum board plant superintendents of National Gypsum Co., at recent company meeting in Buffalo, N. Y. Left to right: Roy Davis, Portsmouth; George Kotapish, Rotan; Al Kohorst, traveling board plant superintendent; Peter Barnes, Bronx; Adam Birkenbach, National City; William Lawson, Clarence Center; George Welch, Fort Dodge; Lewis Seufert, Akron; Richard Tarbell, Savannah

A Theory of the Cause of Ring Formation

By MARK LINTZ*

THIS THEORY of the cause of rings forming in a kiln burning cement clinker concerns the behavior of iron oxides in the clinker during the passage through the burning zone.

The iron in the clinker is figured as tetra-calcium aluminum ferrite. Other ferrites are probably present, and it is a subject of discussion among investigators. However, the iron is in the form of Fe_2O_3. This oxide positions in the molecular arrangements of the compounds as acidic, along with Al_2O_3 and SiO_2 and in such a position it is termed Ferrite. All of the iron is identified as ferrites in the *cold* portland cement clinker.

In metallurgical slags, most of the iron is found in the ferrous condition (FeO). Occasionally some slags are formed under conditions in which some ferrites are identified along with the ferrous compounds. Iron in the form of FeO is a strong base, and readily combines with silica to form ferrous silicates. It also combines with other acidic compounds as Al_2O_3 and even Fe_2O_3. An example of an iron slag is the slag designed in copper smelting. Here it is used for the refining steps in the metallurgy of copper to remove iron from the ores.

If reducing conditions are maintained in a kiln burning cement clinker, the iron will be reduced to the ferrous form. This is the procedure used in the manufacture of white cement, in order to minimize the discoloring effect of the small per cent of iron present in the mix. The iron forms, probably ferrous silicate, which is a pale green glassy material and is less objectionable than the dark ferrites. This hot reduced clinker must be removed and quickly quenched in water or the iron will oxidize on cooling in air and discolor the product.

Thus we have reviewed instances where the iron is utilized in the form of Fe_2O_3 and in the form of FeO; in industrial practices.

Rings generally form in the back end of the burning zone (from the burner end) where the air and flame have their maximum mixing and if the aggregate is in a reducing atmosphere; this combination, with the temperature conditions, results in a zone of maximum reducing effects and there is a reduction of Fe_2O_3 to FeO. When this takes place, the ratio of acid to base is different than the composition designed in the mix. This increase in base is in a mix already so high in base that no fusion is predicted at the temperature involved in a homogeneous mix. However, the mix is hetrogenous and the FeO becomes a new base oxide component. Fusion is also a function of the number of components present, so a particle of FeO combines with adjacent acidic particles and the result is a new fused component. This results in an increased sintering rate, making the clinker sticky. The result is either an increase in liner coating or ring formation.

As the clinker advances in the burning zone, it passes into the area where the secondary air is next to the clinker load, and around the flame. Here strong oxidizing conditions exist and the iron that was reduced to the ferrous form is re-oxidized to the ferric form, as it is identified in the finished clinker. So unless some of the ring material was quickly removed and quenched it would be difficult to prove this theory by analysis. If some operator is agile enough to perform this feat, it will be an interesting report. If ring formation is an operating difficulty, check on the operation as to reducing conditions in the kiln and manipulation of the flame so that an extremely hot tip is not present or that the flame is not impinging on the load may remedy the difficulty.

Occasionally on starting a kiln, or instances where the liner coating is lost, difficulty is sometimes experienced in forming another liner coat. I have watched skilled burners who knew nothing of slag theories or composition, skillfully put on a liner coating. They simply cut the draft and "pour on the fire" to make a beautiful coating in one shift. This procedure results in a reducing condition. In the meantime gas analysis indicated some bad firing practice (?). This is practical operating technique and as usual, the observation of results can be explained on some theoretical deductions such as I have attempted to make here.

It is hoped this article will invite some discussion on the action of iron in the burning zone and result in some practical usefulness to the operators.

*Mining and metallurgical engineer, San Francisco, Calif. Formerly chief engineer, Calaveras Portland Cement Co., 1938-1941, and chief engineer, Permanente Cement Co., 1941-1942.

Increase Lime Kiln Output With Induced Draft

By HERBERT P. BAILEY*

SHAFT KILN quicklime production, as generally known, is increased with the aid of induced draft when correctly applied. Heating of limestone yields quicklime and carbon dioxide gas in accordance with the following equations.

(1) $CaCO_3$ (Calcium Carbonate) + Heat → CaO (Calcium Oxide) + CO_2 (gas) (Carbon Dioxide)

(2) $MgCO_3$ (Magnesium Carbonate) + Heat → MgO (Magnesium Oxide) + CO_2 (gas) (Carbon Dioxide)

By exhausting the gas mechanically at the proper rate, the speed of the dissociation of the limestone is increased, resulting in an increased production of quicklime.

It is not the purpose of this article to discuss the correct application of an induced draft system, the writer merely wishes to show why it is possible to increase production.

Limestone is composed primarily of calcium carbonate with varying percentages of magnesium carbonate, together with minor quantities of various impurities. The percentage of carbon dioxide present in a limestone depends on the purity of the stone. Pure calcium carbonate contains 56 per cent calcium oxide and 44 per cent carbon dioxide; pure magnesium carbonate contains 47.6 per cent magnesium oxide and 52.4 per cent carbon dioxide. Thus, a shaft kiln producing 25 tons of quicklime per day, will yield about an equivalent weight of carbon dioxide, to which must be added the carbon dioxide formed by the combustion of the fuel in the kiln.

An enormous volume of carbon dioxide gas is therefore evolved continuously during the dissociation of the limestone in the kiln. Most operations depend on the natural draft within the kiln to remove the gas. This practice leads to uncertain results as many factors may influence the draft, some beyond the control of the operator. If the gas is NOT removed from the kiln as fast as it is formed, the limestone that is dissociating during the calcination, becomes surrounded by an atmosphere of carbon dioxide, and a state of equilibrium is reached which makes it impossible for the limestone to dissociate further, and the production of quicklime stops.

(Continued on page 93)

*Chemical engineer, The Moores Lime Co., Springfield, Ohio.

These Engineers Plan Your *High-Speed* Packer Installations

JOHN A. DYKER joined St. Regis in 1926 and is now Assistant Chief Engineer at Oswego in charge of packer installation layouts. His long experience covers all phases of packer design, development, and installation, as well as field engineering. With all these activities, he has found time for his hobbies—photography, hunting, and target shooting.

L. E. ("LARRY") MONTAGUE is up in the air whenever he can find time, but now he's right down to earth making detailed packer installation drawings at Oswego. Larry, who joined St. Regis in 1936, is a former Army flight instructor and holds licenses as a commercial pilot and glider pilot.

R. W. ("BUD") CARPENTER has returned to St. Regis after service with the Air Corps. Bud, who joined us in 1937, now specializes on packer installation drawings. His hobbies are fishing and deer hunting.

ROYAL ("ROY") SCHAMPEL joined St. Regis in 1939 with a background of 25 years in plant layout work for several mid-western companies. After a few years as a field engineer in the Chicago office, he came to Oswego where he now uses his skill in making packer installation layouts. For hobbies, he likes cabinet-making and fishing.

Here is another group of St. Regis engineering specialists working behind the scenes in our Engineering and Machine Division at Oswego, N. Y. These experts in plant layout work and detailed planning for packer installations are thoroughly experienced in all phases of packaging. Their accomplishments—added to the helpful "on-the-job" aid provided by St. Regis field engineers—have played an important part in providing better, faster packing equipment for the rock products plants of America.

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Association NEWS

PRESIDENT TRUMAN'S CAMPAIGN for lower prices has had some definite reactions throughout the country, but reports indicate that the response has been somewhat disappointing to the Administration. Not all business can take a cut in prices as the margin of profit is too small. The rock products industries' price levels never did rise appreciably above pre-war levels. One prominent spokesman for the cement industry recently stated that cement prices probably had reached their highest point, and that they would tend to level off. Many of the steps taken by the government have been responsible for stimulating inflation, particularly the encouragement to labor to seek wage increases of 20 per cent on the theory that buying power had to be kept up during what was expected to be a deflation period following the close of fighting. President Truman's advisers guessed wrong.

There are still some shortages of building materials, but in many lines, such as cement, concrete block, sand and gravel, crushed stone and other basic building and construction materials, supply has largely caught up with demand except in a few areas. There is still a tremendous backlog of construction, but many projects have been temporarily held up due to costs rising above planned budgets. Many of these projects will be placed in the bidding stage as soon as construction costs again reach what is believed to be a reasonable level.

Vote Down Government Controls

Although the House voted overwhelmingly to kill nearly all government controls over building materials and construction, including rent controls, it is expected that rent control will be maintained in some form of legislation for perhaps another year.

President Signs Portal Bill

Considerable relief was manifested throughout the rock products industries when President Truman signed the portal-to-portal or Gwynne-Wiley bill which lifts from the backs of industry tremendous retroactive wage claims for small increments of time involved in clean-up, dressing, and preparing for work time. The large vote in the Senate in favor of the bill undoubtedly influenced the President to sign it, as it was generally reported that he had been advised by Secretary of Labor Schwellenbach to veto the bill.

Another hurdle is the labor bill (at the time of writing) now in conference. There is a great deal more skepticism as to President Truman signing this bill. Some believe that with an election coming up in 1948, the President will veto the labor bill as an off-set to his signing the portal-to-portal bill.

Deducting Cost of "Liming" For Income Tax Purposes

HENRY A. HUSCHKE, managing director, Agricultural Limestone Division, National Crushed Stone Association, pointed out to the membership a recent ruling of the Bureau of Internal Revenue covering the deduction of the cost of liming for income tax purposes. He said, "It is our opinion that a majority of farmers, in computing their income tax, deduct the cost of liming farm land as a business expense. According to this new ruling, there are cases when such liming cost should be treated as an exhaustible capital expenditure and amortized over the effective period of the lime application."

Car Supply Requirements

V. P. AHEARN, executive secretary of the National Industrial Sand Association, has sent a questionnaire to the membership on probable car supply requirements, by types, for the second quarter of 1947, compared with the same quarter of 1946. This information was desired by the association in preparing a report for the consideration of the Association of American Railroads. The car supply situation generally is still critical and reports of this kind are therefore extremely helpful in obtaining maximum consideration in the allocation of rolling stock. Replies to the questionnaire indicate that car supply requirements for industrial sand will be approximately 22 per cent greater in the second quarter of this year than for the same quarter of 1946.

Need for Liming Program

Horace Krause, chairman of the Committee on Soil Conservation Programs, Agricultural Limestone Division, National Crushed Stone Association, recently appeared before the House Subcommittee on Agricultural Appropriations in support of a continuance of a $300,000,000 appropriation for this work. Mr. Krause reported that Chairman Dirksen of the House Subcommittee received him cordially.

Some extremely interesting data was presented to show the urgent need of restoring plant mineral food losses if the health and well-being of the country were to be maintained. Mr. Krause, among other data, quoted from the studies of the New Jersey Agricultural Experiment station which developed an Inventory and Balance Sheet of Plant Nutrients in the United States by the late Dr. Jacob G. Lipman and Adrienne B. Conybeare. These studies showed that there is an annual plant food loss in the United States of 55.6 million tons of calcium and 20.5 million tons of magnesium. Potassium losses are 45 million tons annually. The loss of calcium and magnesium represents 57 per cent of the total, and exceeds the loss for other elements combined. Mr. Krause in his report pointed out that it is these two elements that are supplied by liming materials. The loss of the three basic or alkaline elements; potassium, calcium, and magnesium represents 90.7 per cent of the total, whereas the acid-forming elements, nitrogen, phosphorus, and sulphur, suffer a loss representing less than 10 per cent of the total.

Labor Board Can Void State Act

The U. S. Supreme Court recently ruled that state labor relations boards must keep hands off if a labor dispute is of a type with which the National Labor Relations Board deals. The court's 6 to 3 decision upset a New York board's order for two steel companies to recognize foremen's unions. Justice Jackson, who wrote the majority opinion, said the N.L.R.B. "has jurisdiction of the industry in which these particular employers are engaged and has asserted control of their labor relations in general," and he further added, "We do not believe this leaves room for the operation of the state authority asserted."

The decision was given on appeals by the Bethlehem Steel Co., in a case affecting its mill in Lackawanna, N. Y., and by the Allegheny Ludlum Steel Corporation, operator of mills at Dunkirk, N. Y. Chapters of the Foremen's Association of America asked the state board to certify them as bargaining agents for supervisors in the plants. The firms disputed the jurisdiction of the state board, but lost in New York courts. They then appealed to the U. S. Supreme Court. The corporations contended that since they were engaged in interstate commerce, the national labor relations board alone had authority to determine the bargaining units.

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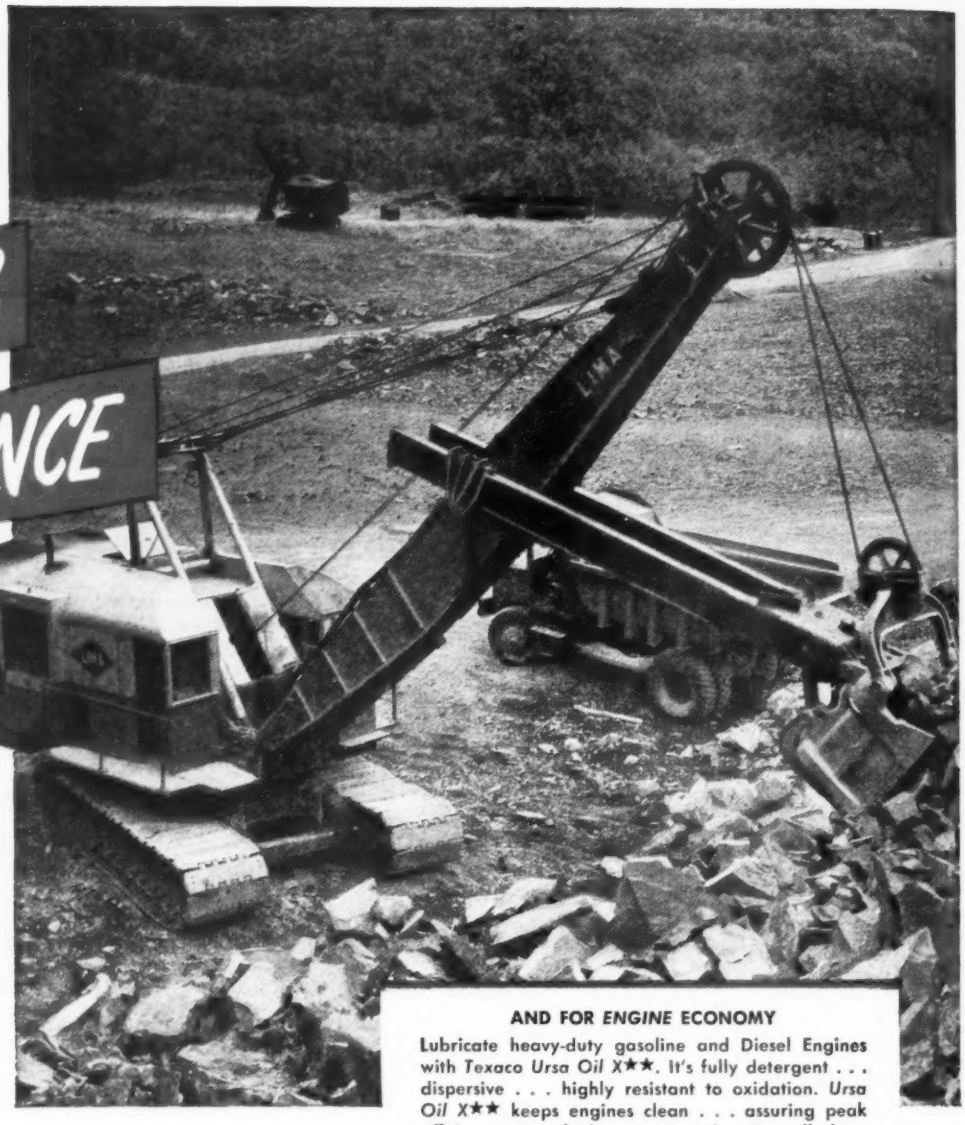

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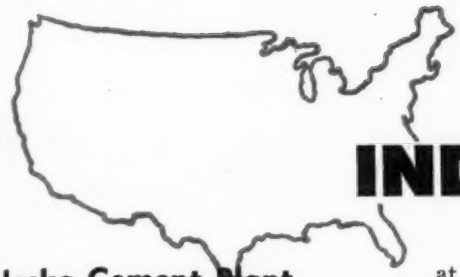


INDUSTRY *news*

Alaska Cement Plant Uses Orofino Equipment

ALASKA CEMENT CORPORATION, is the name of a new cement company which will start operations near Anchorage, Alaska. Equipment from the former Orofino, Idaho, plant of Washington-Idaho Lime Products Co., will be used in the new plant. The Orofino plant was forced to close down as a result of a court injunction against an alleged dust nuisance. The Alaska plant will have a capacity of 600 bbl. daily, and will cost $1,250,000. Limestone will be obtained from a deposit near Seldovia, Alaska, and shipped by barge to the plant. Gypsum will be shipped from Sheep Mountain, 130 miles away. The new company already has a contract to supply 180,000 bbl. of cement for local consumption and for military construction.

Construct Ready-Mix Plant To Supply Power Project

MASSARO WASHED SAND AND GRAVEL CO., INC., Fulton, N. Y., is perfecting plans for a $100,000 ready-mix installation to supply concrete for the third unit of the Oswego steam plant of the Central New York Power Corp., Oswego, N. Y. Crushed stone for the plant will be brought in by rail from Jamesville with sand from the Massaro workings, Volney. Cement will be purchased in bulk and transported to the new plant.

After an extensive survey of the area, Peter Massaro, president of the company, believes there will be sufficient demand for ready-mix concrete to justify operation after the steam plant is completed.

Open Ballast Plant

CRUSHED STONE CO., has opened a large quarry and crushing plant for the production of ballast and other stone products southeast of Joplin, Mo. The plant is owned and operated by H. D. Youngman of Baxter Springs, Mo. Approximately $180,000 has been expended for plant and equipment. Ed Brisch of Picher is superintendent of operations. All of the sales have been handled through the Baxter Chat Company. The deposit is a chert rock with a 50- to 60-ft. strata.

Building Lime Plant

KELLEY ISLAND LIME AND TRANSPORT CO. is building a lime plant at White Rock, Ohio. H. K. Ferguson Co., is building this plant, and also is modernizing existing quarry facilities at Gibsonburg, Ohio. When this work is completed, the plant will have a production of 2000 tons of limestone daily. Cost of this work will be $800,000.

Eastern Cement Strike

PRODUCTION of cement was curtailed drastically in the East with 21 cement manufacturing plants in New York, Pennsylvania and Maryland strike-bound. It is to be hoped that a settlement will be reached before this issue goes to press. Cement companies have offered a 15-cent per hour across-the-board increase which would raise the basic rate to $1 an hour. The companies in turn were seeking a change in seniority rules to allow management to make its own promotions regardless of seniority rating. Another change sought involves payment for pack-house division labor working after 6 p.m. At present, time and one-half is paid for work after 6 p.m., even though workmen may report to work on the 3 p.m. shift.

Organize Pipe Concern

SHERMAN CONCRETE PIPE CO., Johnson City, Tenn., has been organized with a capital of $100,000. Officers are Thomas E. Arp, president and treasurer; and I. W. Green, vice-president and secretary. Three acres of industrial property have been acquired for the plant and yards. These men are associated with the Sherman Concrete Pipe Co., Knoxville, Tenn. Mr. Arp will continue as manager of the Knoxville plant, but Mr. Green will move to Johnson City to manage the new plant.

Natural Cement for Minnesota Highways

A LAW is now on the statute books of Minnesota requiring the state highway department to specify 15 per cent natural cement and 85 per cent portland cement on all new concrete highway paving construction before January 1, 1948. The original bill proposed the 15 per cent requirement on all paving for the next two years, but it was amended to cover contracts let prior to the first of next year. The Carney Co., Mankato, Minn., is the only manufacturer of natural cement in Minnesota.

Buy Paper Concern

NATIONAL GYPSUM CO. has purchased Western Board and Paper Co., paper mill at Kalamazoo, Mich., to assure an adequate supply of lining paper. The company now has three paper plants.

Start Roofing Granules Plant in Arkansas

MINNESOTA MINING & MANUFACTURING CO., St. Paul, Minn., recently shipped the first carload of roofing granules from its new plant near Little Rock, Ark. Daily production in the still uncompleted plant is approximately 500 tons. When the plant is completed in 90 days it is expected to produce 200 thousand tons of colored granules annually. The product is sold to asphalt roofing manufacturers.

Appeal Verdict Against Cement Company

LONE STAR CEMENT CORPORATION, New York, N. Y., plans to appeal a $60,000 award by a jury in Supreme Court, Columbia county, to Charles Hallenbeck, Jr., 16-year-old Hudson, N. Y., boy who was blinded by explosives obtained on property of the company. The boy obtained a dynamite cap while trespassing on company property. This case points to the necessity of forbidding all trespassing on company property, particularly of children, and to keep all explosives in some secure place.

Reopen Old Quarry

CONCRETE MATERIALS CO., Sioux Falls, S. D., is installing new and larger capacity machinery in its old quarry near this city, that had been abandoned in 1930. The great demand for building material in the area proved the present site inadequate, and the decision to reopen the old quarry rather than re-build the existing plant seemed to offer greater possibilities for expansion, according to Carl T. Crampton, manager.

The new equipment, when completed, will have a capacity of 150 tons of rock per hour, as compared to 40 tons for the present plant. It has not yet been determined whether or not to continue operating the smaller quarry.

Advises Blasting Not Damaging

DR. L. DON LEET of Harvard University recently made tests of blasting at the France Stone Co., quarry at Bellevue, Ohio, which indicated that no damage could result to buildings in the city limits. The France Stone Co. has requested the city council to modify a city ordinance which forbids blasting in the city limits. Officials of the company pointed out that it had a large backlog of orders which could not be filled unless it was permitted to blast.

Building Gravel Plant

JANESVILLE SAND AND GRAVEL CO., Janesville, Wis., is completing plans for the construction of a sand and gravel plant on the site known as the No. 3 pit. According to J. K. Jensen, president, the company owns 105 acres of land adjacent to this pit of which only about one-third has been developed. It is estimated that there is sufficient material in the deposit to last 50 years.

Cement for Big Dam

COLORADO PORTLAND CEMENT CO., Denver, Colo., was low bidder for 33,100 bbl. of cement for the Horsetooth Reservoir west of Fort Collins, Colo., now under construction by the Reclamation Bureau. The low bid was $93,000.

Publicize Annual Report

MARQUETTE CEMENT MANUFACTURING CO., Chicago, Ill., has joined those progressive companies that have given wide-spread publicity to the annual report of the company's operations. Half-page advertisements were published in newspapers of the principal communities served, presenting the company's 1946 net receipts from sales and graphically showing the distribution of each income dollar. These advertisements are called its "annual report to the community."

To Build Feldspar Flotation Plant

FELDSPAR MILLING CO., INC., Spruce Pine, N. C. has plans well under way for the erection of a feldspar recovery plant using the flotation process. C. P. Rogers, president has announced that the plant will cost about $500,000. A tract of 160 acres has been obtained.

Wolverine to Reorganize

THE WOLVERINE PORTLAND CEMENT CO., Kalamazoo, Mich., operating plants at Coldwater and Quincy, has been ordered by the federal district court to discontinue the production and sale of cement, except that clinker grinding will be continued and limited maintenance work kept up. A petition was recently filed to permit a reorganization, and it is understood that authority has been obtained to provide the necessary working capital.

Advertisement of Marquette Cement Manufacturing Co. presents in a very friendly and easily understood form the salient facts concerning the company's financial statement and how its income is expended

Adding Grinding Plant

ACME LIMESTONE CO., Fort Spring, W. Va., has purchased machinery for the construction of an additional grinding plant to cost about $125,000. According to J. A. Rigg, vice-president and general manager, this plant will be devoted primarily to the production of limestone flour for rock dusting coal mines. It is said that this plant will have sufficient capacity to furnish the entire rock dust demand of the coal mines on the C & O, Virginian, and New York Central Railroads. Additional machinery to double the company's output of agricultural limestone also will be installed.

Reopen Gravel Pit

FENTON CONSTRUCTION CO., Piqua, Ohio, has reopened its sand and gravel deposit near this city which has been closed for several years. The pit was originally opened almost 25 years ago by Ralph Bowsman, and was operated until after the outbreak of the recent world war. The Fenton Construction Co. took over this property in 1945 when Mr. Bowsman sold his interests. J. S. Reddick is superintendent of the reopened plant and James A. Pratt is sales engineer.

Phosphate Substitute Found

SCIENTISTS in the University of Washington's chemical department have been experimenting with a new fertilizer that they are convinced is equal to the superphosphate fertilizer now on the market as a soil enricher. The new product will compete in price with standard fertilizers. Phosphate rock mined in Montana and Idaho, and olivine rock which is found plentifully in Washington, are the base used for making the new fertilizer. One firm, making use of the locally available minerals and adequate electric power, is already building a plant for manufacture of the new phosphate substitute.

Lone Star Expansion

LONE STAR CEMENT CORPORATION, New York, N. Y., has announced that more than $1,000,000 will be spent for equipment and machinery to boost capacity by approximately 50 per cent, according to H. A. Sawyer, vice-president. Contracts are being placed for delivery and installation of equipment needed to boost plant capacity to a total of 2,200,000 bbl. per year.

Open Agstone Plant

E. J. COWAN, president of the Silica Products Co., Tacoma, Wash., recently announced that he and his associates plan to open an agricultural limestone plant northeast of Arlington, Wash., which is near Everett, Wash. It is planned to go into production June 1.

Missouri Limestone Producers Meet

MEETING recently in Kansas City, Mo., the newly organized Missouri Limestone Producers Association went on record as being primarily concerned with improving the quality of limestone produced. The meeting, attended by about 50 members, heard Arthur Arvis, association secretary-treasurer, comment on the expected 50 per cent curtailment in agricultural limestone spreading as a result of President Truman's recommended cut in soil conservation appropriations.

Cement Prices at Peak

PRESIDENT W. A. WECKER of Marquette Cement Manufacturing Co., Chicago, Ill., in his recent report to the stockholders, pointed out that while cement prices remain extremely low in relation to all other price indexes, "We believe these prices are now as high as they should go and hope they can be left at this level." Latest U. S. Bureau of Labor Statistics index of wholesale prices shows the average price gain for all building materials to be 75 per cent between the 1926 mean and March 15, 1947. On the same index, cement shows a gain of only 11.9 per cent, which is the least recorded by a listed commodity.

Pennsylvania Agstone Meeting

THE PENNSYLVANIA STONE PRODUCERS ASSOCIATION held a meeting on May 15 in the Hotel Penn-Harris, Harrisburg, Penn., in conjunction with the Production and Marketing Division of the Field Service Branch, Agricultural Adjustment Administration. This meeting was held to afford the representatives of the government Production and Marketing Branch to advise agricultural limestone producers about plans for making liming materials available to Pennsylvania farmers for the year 1948.

Pit Location Tested

ED SCHRAMM is installing a gravel washing and loading plant on a new site north of Cokato, Minn., where it is estimated that there are 40 acres of solid gravel averaging 150 feet in depth. Repeated tests of this gravel show its slate content to be exceptionally low. The results of absorption tests also are considered good.

Schramm expects to take 1000 cu. yd. per day out of the new pit. He will distribute the gravel in six of his own trucks to supply contractors and concrete plants over a 40-mile radius from the pit.

Expand Quarry Operations

SOUTHERN QUARRIES AND CONTRACTING CO., formerly the Southern Ohio Quarries Co., Columbus, Ohio, recently held a three-day meeting of official personnel at Chillicothe, Ohio, to discuss expanding operations. The company recently completed a new bituminous mix plant at Chillicothe. It has about $600,000 of road contract work in Kentucky for 1947, and is now preparing for its Ohio program.

Pipe Regional Meetings

AMERICAN CONCRETE PIPE ASSOCIATION, Chicago, Ill., has been holding a series of regional meetings. On May 2, a regional meeting was held at the Sir Walter Hotel, Raleigh, N. C., for members in Delaware, Maryland, Virginia, North Carolina, Eastern Tennessee, and the District of Columbia. A meeting on May 5 at the Hotel Wade Hampton, Columbia, S. C., was attended by members from South Carolina, Georgia, and Florida. At a meeting held May 19, at the Hotel Peabody, Memphis, Tenn., members from Arkansas, Western Tennessee, Alabama, Mississippi and Louisiana were invited.

Cement Plants for South Africa

ANGLO-ALPHA CEMENT CO., of South Africa has placed an order with Allis-Chalmers Manufacturing Co., to supply equipment for two cement plants involving an expenditure of $1,600,000. Each cement plant will have a capacity of 300 tons per day. Edward L. Bateman, Johannesburg, South Africa, is the South African sales manager for Allis-Chalmers, identified with the company since 1889.

Marquette Cement Moves

MARQUETTE CEMENT MANUFACTURING CO., Chicago, Ill., recently moved its offices to larger quarters at 20 N. Wacker Drive in the same city. It had been located in the Marquette Building at 140 S. Dearborn St. for the past 49 years. The company has cement manufacturing plants at Oglesby, Illinois; Des Moines, Iowa; Cape Giradeau, Missouri; and Nashville and Cowan, Tennessee; with other operations at Milwaukee and Green Bay, Wis.

To Build Haydite Plant

THE CARTER-WATERS CORPORATION, Kansas City, Mo., will construct a large Haydite lightweight aggregate plant at New Market, Mo., which will cost about $300,000, according to an announcement by A. R. Waters, president. Capacity will be 10 carloads per day.

Install Diesel Units

HOUGHTON STONE CO., Kingston, Mo., has installed new equipment at its stone quarry near Kingston. Two Diesel power units, belt conveyors, and a pulverizer have been added to the plant equipment.

Boost Cement Plant Cost

IDEAL CEMENT CO., Denver, Colo., in its very favorable 1946 annual report referred to the big construction program of the company. The original estimate in August, 1946, indicated that the cement plant additions would cost $8,500,000. This has now been revised up to $10,000,000. The program includes additions to the plants at Portland, Colo.; Devil's Slide, Utah; Houston, Texas; Okay, Ark.; and Trident, Mont. Three major reasons were given in the report for these plant additions: (1) to effect economies in production cost; (2) to maintain capacities adequate to the increasing demands in those areas in which the company is the dominant producer of cement, such as Colorado, Utah, and Montana; and (3) to pick up maintenance deferred, of necessity, during the war period.

Texas to Tax Industry

A BILL was recently introduced in the Texas legislature by Rep. Harley Sadler of Sweetwater which would impose additional taxes on industrial minerals. The following are included: lime 2½¢ per 100 lb.; asphaltic limestone, 5¢ per ton; basalt, 5¢ per ton; sand, shells, gravel and clay, 2½¢ per ton; limestone, crushed, 2¢ per ton; granite, marble and sandstone, crushed, 2¢ per ton; magnesite, 5¢ per ton; feldspar, 5¢ per ton; fluorspar, 5¢ per ton, Fuller's earth, 18¢ per ton; gypsum, 1/20¢ per ton; pumice, pumicite, 40¢ per ton, and soapstone, 10¢ per ton. There appears to be little chance of this bill passing, but it will bear watching.

Reduce Nebraska Freight Rate on Aggregates

THE STATE RAILWAY COMMISSION of Nebraska recently cut the original increase of 15¢ per ton for single car shipments of sand, gravel and crushed stone to an increase of 10 per cent over the 1946 base rates. This order was the result of a hearing March 31 when sand and gravel shippers protested against the rate increase granted all Nebraska railroads.

Buy Another Quarry

BOONE QUARRIES, INC., has purchased the Columbia Stone Products Co., Columbia, Mo., according to Harold Johnson, one of the Boone Quarries owners. Fred McNaughton, one of the former owners of Columbia Stone Products Co., will be superintendent.

Reopen Quarry

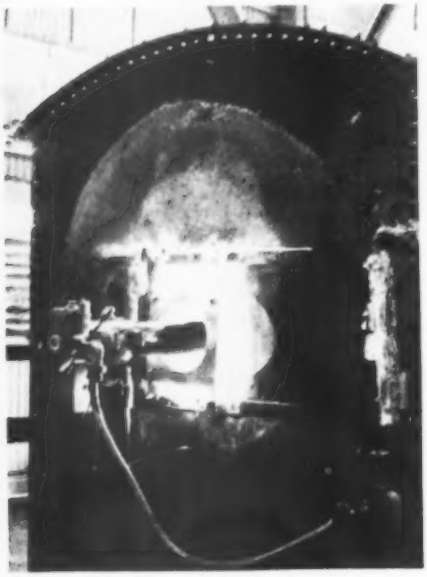
THE GEORGE M. BAKER CO., Carthage, Mo., has reopened the quarry at Lockwood, Mo. A production of 75,000 tons a year is planned. Mr. Baker formerly operated a quarry at Gilmore City, Iowa.

HINTS and HELPS

PROFIT-MAKING IDEAS DEVELOPED BY OPERATING MEN

Oil Burner Installation For Rotary Lime Kiln

THE AUBURN LIME PRODUCTS CO., Auburn, Calif., recently installed a rotary kiln 60 ft. long which is rather short, but due to the use of a Lintz



Simple, yet efficient method of mounting the oil burner and oil and air lines

preheater for stone and oil preheaters, oil consumption is low.

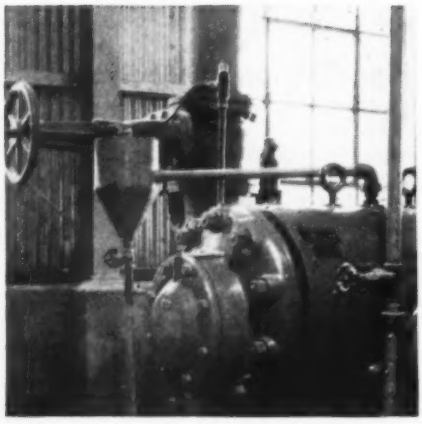
Oil is preheated twice before it reaches the burner, is delivered to the burner at a temperature of 160 deg. F. No combustion chamber is used. The burner, using low pressure air, is mounted in a housing at the discharge end of the kiln. Some air enters around the outside of the burner but the flow is such that the temperature at the feed end of the kiln is 1500 deg. F. This hot air enters the bottom of the preheater.

Compressor Water "Insurance"

AT the bulk cement loading plant of the Permanente Cement Co., at Redwood City, Calif., port, there are two duplex Fuller compressors supplying air to the Fuller-Kinyon cement pumps.

To assure that water is entering the compressor heads, a novel device has been installed. It consists of a welded steel housing, cone-shaped, and about 8 in. in diameter. In this housing is mounted a rubber diaphragm, shown in the illustration, the assembly being mounted on the outlet water line from the compressor head.

In use, the water valve "A" is turned on full force. Valve "B" is adjusted so that back pressure forces the diaphragm up. Once this adjustment is made the valve "B" is wired in that position and need not be opened or closed for repeated starting and stopping of the compressor. To the



Arrangement to insure that water is entering the compressor heads

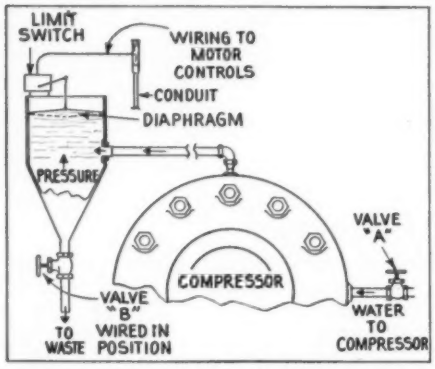


Diagram showing piping and wiring for device to insure compressor head water supply

top of the diaphragm is mounted a vertical rod that actuates a Square D limit switch mounted on top of the assembly. This limit switch is tied in with the main Westinghouse motor controls so that the driving motor cannot be started until the water pressure in the housing is sufficient to force up the diaphragm and the limit switch. If water flow stops for any reason while the compressor is in operation, the device shuts off the electrical current flowing to the motor.

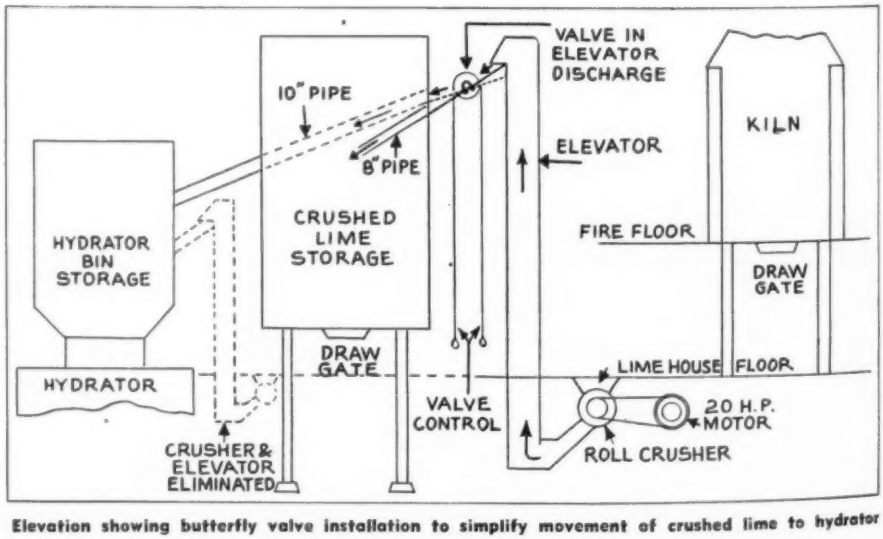
It is a neat and fool-proof arrangement and its use could be extended to all water-cooled compressors. It was developed by the operating staff of the bulk loading plant with R. J. "Rocky" Ryan, superintendent, spark-plugging the venture.

Conveniently Operated Hydrating Plant

By E. M. CONFER

SOUTHERN LIME CORPORATION, Calera, Ala., recently was confronted with the problem of rearranging its plant to provide increased crushing capacity for its lime hydrator. The arrangement shown in the illustration eliminated the necessity for purchasing a new elevator and crusher.

It will be noted that a butterfly valve has been installed where the elevator, taking the product of the roll crusher, discharges into the chute to crushed lime storage. This valve now permits the lime house crew to divert the crushed lime from the elevator into a 10-in. pipe connected to the Schaffer hydrator storage bin. The butterfly valve is easily operated from the floor by means of ropes and a wheel on the valve. The valve is installed with three ⅝-in. U-bolts on a 2-in. shaft, 3 ft. long. Made of sheet iron, the valve is ⅛-in. by 20 in. wide and 6 ft. long. A screen may also be fastened to the shaft. The two ropes leading to the butterfly valve are of ⅜-in. soft wire. The Schaffer kiln has a capacity of 50 tons of lime, using a mixed feed and burning coke.



Elevation showing butterfly valve installation to simplify movement of crushed lime to hydrator

"Coyote" Hole Excavated With Drag Scraper

CONSIDERABLE crushed stone, sand and gravel in the State of Oregon is produced by portable and semi-portable crushing and screening plants. Especially is this so for State highway work in the more remote areas.

Mucking out "coyote" blasthole with drag scraper

The State (and counties) own these pits. Aggregates they produce are first tested by the State engineers and if satisfactory, the contractor-producer moves in his equipment until the work is completed. Therefore contractors can be classed as producers although they do not own the pits or quarry outright.

The Multnomah County quarry located about five miles from Estacada, in Western Oregon, is such an operation.

To produce stone cheaply it was decided to blast the material by using a coyote hole so a contract was let to Jim Cole of Portland to drive the necessary tunnel and cross cuts.

The underground work is in the form of the letter "T." The leg of the "T" is about 50 ft. long and each arm is about 60 ft., the lower tip of the leg being the tunnel's portal. The tunnel is about 36-in. high and 36-in. wide. The face of the quarry is about 50-ft. high. No churn drill holes were to be used. The rock is a hard, fine grained material resembling eastern trap rock.

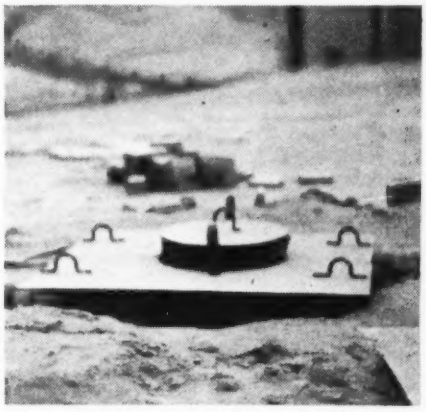
Anyone who has driven coyote holes of small diameter knows the difficulties of mucking out in such close quarters, so Mr. Cole called in the engineers of the Pacific Steel Foundries, Portland, Ore. As a result a 24-in. (wide) drag scraper was recommended and one of this company's "slushers" placed in operation. Figures are not available as to the cost per foot for mucking, but it was said that on the basis of $10.00 per foot, contract price, five slushers could have been easily paid for out of earnings on this one contract.

After each blast the muck pile was first levelled off with a heavy garden hoe. Then the tail pulley was fastened to a holder inserted in a drill hole in the face. The holder was wedged in place by a steel wedge. A two-drum, Ingersoll-Rand air tugger then pulled out the muck with the Esco scraper. For removing the muck from the arms of the "T," two handlings were required. Drilling was done with jack hammers and replaceable bits.

Zinc Melting Furnace

AT THE NEW PLANT of Kern Rock Co., Bakersfield, Calif., a zinc melting furnace of novel design is being tried out. It consists of a steel welded, cylindrical pot about 16 in. in diameter and having a slightly shallower depth. This pot holds the zinc, but surrounding it is a second cylindrical container which serves as a fire-box. Both units have removable tops with suitable handles.

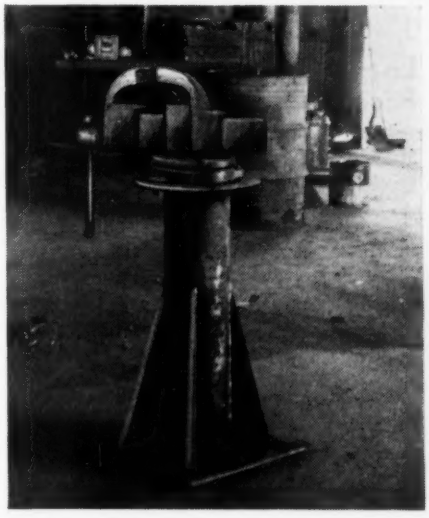
Oil with air for atomization is introduced into the outer container at a tangent thus giving the flame a circular direction which heats the inner pot uniformly. The melted zinc, of course, is to be used to replace bearing parts on the two Symons cone crushers. These crusher installations, previously described, are mounted on 10-in. steel legs to facilitate maintenance instead of the concrete piers usually employed.



Melting furnace for zinc used in making crusher repairs

Mounting for Shop Vise

MOST SHOP VISES are mounted on some type of work bench. Usually the bench is of wooden construction, and when a real strain is put on it, the vise pulls away from the mounting or the bench tends to tip over.



Vise supported on section of pipe to which flanges are welded

In the shop of the Service Rock Co., near Riverside, Calif., Phil Larsen, superintendent, has mounted a vise on a vertical length of 8-in. diameter steel pipe. Suitable sheet steel flanges are welded to the bottom, and bolted to the concrete floor of the shop. The top has a smaller steel plate flange to which is bolted the vise. This mounting can not be easily tipped over, and the workman can get at all sides of the work held in the jaws of the vise.

Concrete Loading Platform

RADCLIFF AND BERRY, INC., Orleans, Ind., has constructed a concreted storage area for concrete brick at an elevation higher than the ground so that trucks can back up to the edge of the storage area and receive a load from the ground to the height of the truck body. The truck loading station is shown in the accompanying illustration.

Storage area paved with concrete has retaining wall to which trucks back up to facilitate loading

NEW MACHINERY

Large Overhead Eccentric Jaw Crusher

LIPPMANN ENGINEERING WORKS, Milwaukee, Wis., recently completed what is claimed to be the largest

Movable jaw of large eccentric jaw crusher

overhead eccentric jaw crusher, a 36- x 48-in., with a hard rock capacity of 210 t.p.h. at 3-in. discharge opening. The completed crusher stands 11 ft. ½ in. high, weighs 84,000 lb., and the movable jaw is 10 ft. 10 in. high, and weighs 35,000 lb.

Dual-Duty Locomotive

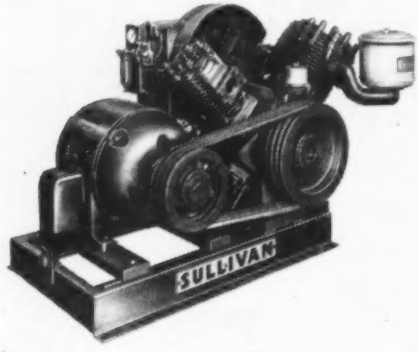
WESTINGHOUSE ELECTRIC CORPORATION, East Pittsburgh, Penn., has designed its Dual-Duty electric locomotive to work at the mine face where slow speeds are required and then haul loaded cars to the main siding with dispatch. While this locomotive was designed primarily for coal mining transportation, it is equally adaptable to haulage in other mining operations.

Nominally rated 8 tons, this locomotive has two speed ranges; from a creep speed to rated 5 m.p.h. when operating on the reel for gathering and, from a creep speed to rated 7½ m.p.h. when operating on the trolley for hauling to a main siding. This two-speed feature is obtained by operating the motors on full field only when on the reel and on full field, or shunted field at higher speeds, when on the trolley pole.

Service brakes are hydraulically operated and an accumulator makes possible three or full brake applications after power is shut off. Parking brakes are screw operated and can be used as service brakes. Should an emergency arise, such as a power failure, that would necessitate reversing the motor controller to help bring the locomotive to a stop, current limiting feature protects the motor from excessive currents.

Air-Cooled Compressor

JOY MANUFACTURING CO., Sullivan Division, Pittsburgh, Penn., has placed on the market a new line of two-stage, air-cooled stationary air compressors. These "Unitair" compressors are available in nine sizes with

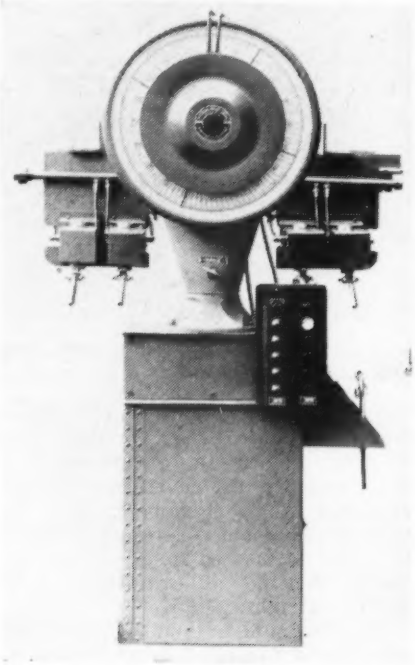


Two-stage air compressor available in nine sizes

power requirements ranging from 15 to 100 hp., and piston displacements from 81 to 590 c.f.m. at 100 lbs. discharge pressure per sq. in., based on 60-cycle motor speeds. Three standard electric drives include built-in motor, direct-connected motor and V-belt, and they may also be equipped for use with gasoline or Diesel engines.

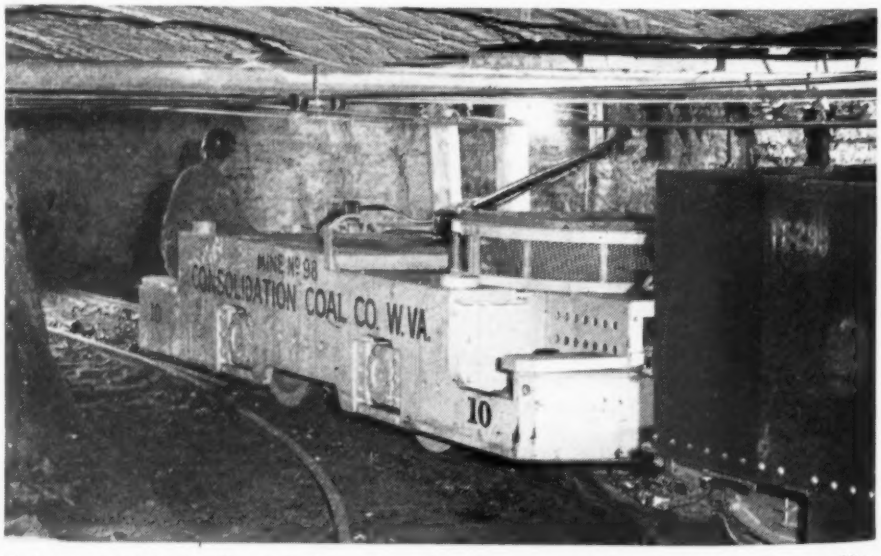
Automatic Weigh Batching Unit

CONVEYOR CO., Los Angeles, Calif., has brought out an automatic weigh batching unit designed for use on all



Electronically controlled weigh batching unit

batchers for ready mixed concrete and asphalt mix plants. This electronic weight control unit is designed around standard electrical equipment and uses a dial scale with a single indicator hand and one photo-electric



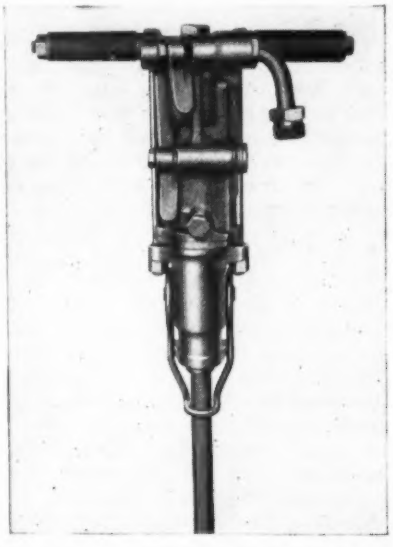
Explosion tested locomotive is hauling a trip of empty cars from the main siding to the working area in a large mine

cell. The entire electrical system is located in a small removable panel on the base of the scale. An ingeniously guided light beam transfers the signal to the photo-electric eye activated batcher bin gates for each kind of material as the arm on the dial scale reaches pre-selected weights. Adjustment of weights for each type of aggregate is made from the front of the dial. Once set, batching to these predetermined weights is done automatically.

The flexible electronic weight control unit is adaptable to either semi-automatic batching or full automatic operation, and a change from automatic to manual operation can be made at any time by throwing a single switch.

Light-Weight Rock Drill

INGERSOLL-RAND CO., New York, N. Y., has brought out a light-weight rock drill in the 30-lb. class, the J-30 jackhammer. This drill was designed



Drill has sealed throttle valve, two-piece chuck, and long wearing piston

for drilling medium to hard rock. For coal mining, the machine is equipped with an extension grip handle and rider pads that make it easy to drill from a plank. It is also a useful tool for drilling foundation holes in concrete, block holing, and many other purposes. A feature of this rock drill is a three-in-one backhead which allows the machines to be easily converted to any one of three types of machines; wet, dry, or blower type.

Automatic Reset For Crusher

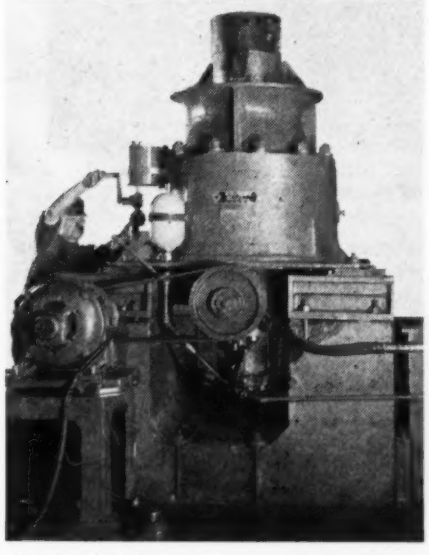
ALLIS-CHALMERS CO., Milwaukee, Wis., has developed an automatic reset which operates to discharge unbreakable material from the Type "R" reduction crusher. The new device provides an automatic, positive method of resetting the crusher after the head has lowered and permitted the passage of unbreakable substances.

Demonstration of automatically coupled trailer on the West Coast

When any such objects enter the crushing chamber, pressure in the hydraulic system is increased sufficiently to compress a gas-filled bag and oil enters the automatic reset's steel shell, permitting the crushing head to lower sufficiently to discharge the unbreakable material.

When the unbreakable material is discharged, the gas pressure in the bag forces the oil out of the automatic reset and the crushing head is returned to its operating position. The automatic reset functions entirely separate from the speed set control, which is used by the operator to adjust the crusher, change product size, or compensate for wear on the crushing surfaces.

Pressure in the reset is adjusted to



Showing installation of automatic reset on reduction crusher

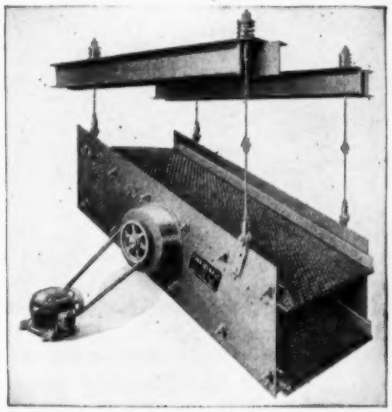
suit the particular material being handled, and can be operated at pressures to accommodate all kinds of Type "R" crusher conditions.

Automatic Coupled Trailer

FRUEHAUF TRAILER CO., of California, Los Angeles, Calif., has developed a trailer having an automatic coupling device whereby the draw-bar automatically attaches to the truck. It is a two-axle full trailer with a roll-off body. It is 20 ft. long with a 15 ft. draw-bar. This model has 10 x 20 12-ply tires, and axles are of I-beam construction rated at 20,000 lb. strength.

Concentric-Action Screen

LINK-BELT CO., Chicago, Ill., is offering a vibrating screen known as the "CA" concentric-action screen. It is an inclined floor-mounted or spring-



Cable and spring suspended concentric-action screen; also available for floor mounting

and-cable suspended screen with an ingeniously balanced two-bearing vibrator mechanism which imparts a concentric or circular vibrating motion to all points of the screening surfaces. The screen can be used for both medium and heavy duty sizing as well as for scalping and dewatering or rinsing operations.

The screen is made with double or triple decks and in sizes ranging from 3- x 8-ft. to 6- x 14-ft. Single-deck screens can be provided by merely removing the lower deck of the standard double-deck screen.

Advantages claimed for this screen are greater amplitude at high speeds; unobstructed screening surface; true circle vibrating movement; controlled screen cloth tension; less abnormal vibration through critical ranges in starting and stopping; and minimum starting torque.

Longest Dry Process Cement Kilns

Lawrence Portland Cement Co. produces clinker at 850,-000 B.t.u. per bbl. in two 9- x 314-ft. rotary kilns; flow through kilns is uniform and dust loss low

By BROR NORDBERG

Looking toward feed end of two new kilns

PERFORMANCE of the two 9- x 314-ft. dry process rotary cement kilns of Lawrence Portland Cement Co., at Northampton, Penn., after six months of service, demonstrates the practicability of very long kilns with dry feed, in the attainment of low fuel utilization without operational complications. The kilns are producing portland cement clinker at the rate of 1500 to 1600 bbl. per day each, with a fuel consumption of 65 lb. of 13,500 B.t.u. coal per bbl. (average of 850,-000 B.t.u. per bbl. of clinker); and are operating without surging and with extremely low dust loss.

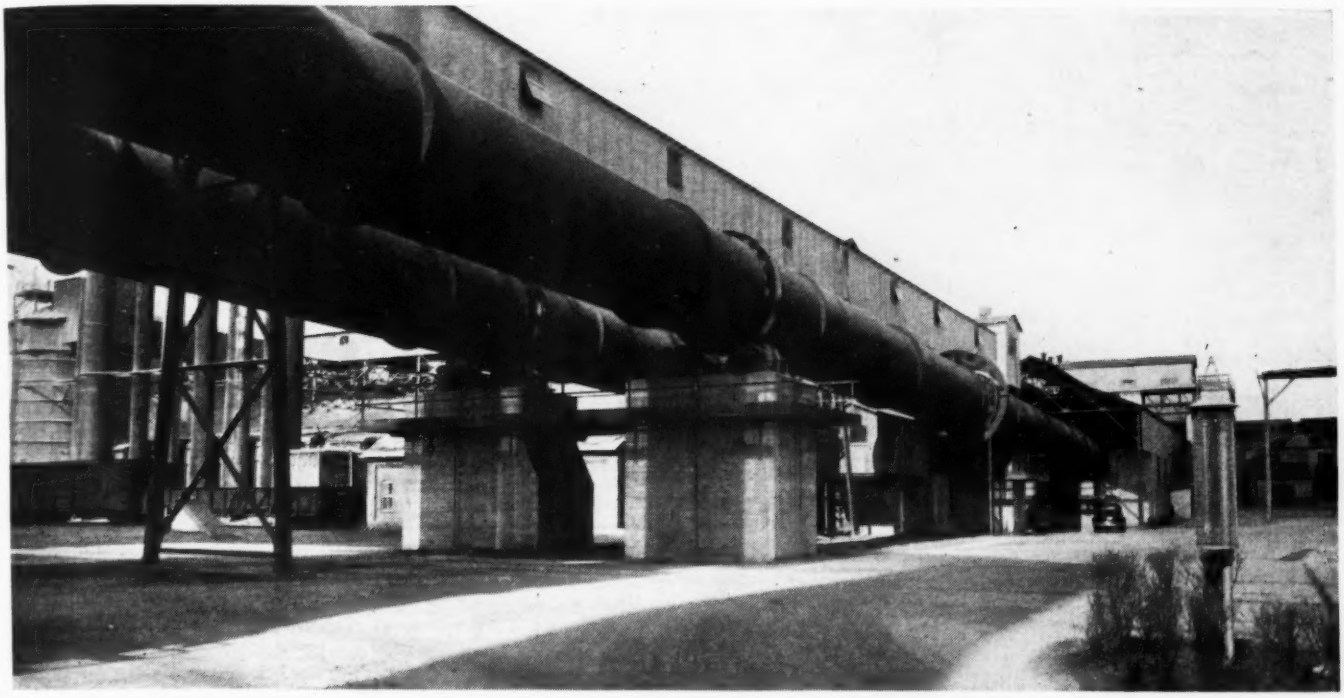
While these kilns are the longest by far in service for dry process cement mill operation in the United States, and probably anywhere, there is nothing else unusual about the kilns as such. They are typical Unax kilns, with relatively high ratio of length to diameter (35:1) as commonly used for the wet process; there being only a few innovations in related operations that have contributed to the absence of load fluctuation and the low dust loss, which had been anticipated as possible operating difficulties. F. L. Smidth and Co., engineers and machinery manufacturers, supplied the kilns, coal firing equipment and controls; fabricated part of the material handling equipment; and were engineers for the entire installation.

Results from the kilns, considering operating experience and the soundness and uniformity of the product, would indicate that this "experiment" conceivably may change some prevalent theories as to optimum type and length of kilns for cement manufacture. Length is the main answer to low fuel consumption at Northampton, there being no heat exchangers or preheating devices or other apparatus to complicate operation or to add to power requirements. Equipped with standard Smidth control apparatus and rate of feed synchronization with kiln speed, the only material departures from a standard installation, equipmentwise, are a system of positive and uniform rate of kiln feed, the use of submerged feed-spouts, relatively low air velocity through the kilns, extra provision to prevent overheating the induced draft fans and a kiln slope of 7/16 in. per lineal foot of length which compares with ½ in. for Smidth long wet process kilns.

Kilns

The two kilns have replaced one of 8- x 9½- x 150-ft., one 6- x 7- x 150-ft., one 8- x 150-ft. kiln, and one 8- x 9½- x 180-ft. kiln, but seven of the original kilns are still operative, measuring 6- to 8- x 110-ft. Combined normal capacity of the plant now is 5800 bbl. of clinker per day. Production of the new kilns is transported to the grinding mills over the old McCaslin system. Raw material is conveyed overhead to the new kiln feed bins from the existing plant blending bins.

All-welded, the kilns are supported on five sets of rollers and have the 7/16 in. slope as a precaution against surging, when turning at a normal speed of 75 r.p.h. The drive is a 50-60 hp. D.C. electric motor, with a speed range of 300 r.p.m. to 1200 r.p.m., through Falk spur gear reducer (31-hp. average imput), synchronized with the feed material screw drive—the conventional receiving-sending electrical unit typical of modern Smidth installations. A 60-hp. International oil-burning engine (2), through a Link-belt silent chain drive to the main gear reducer, may be quickly pressed into service for the purpose of turning each kiln during down periods. The Unax cooler consists of ten 3 ft. 5 in. cylinders 17 ft. 3 in. in length, lined with heat resistant cast steel and refractory liners because, in this installation with its high fuel efficiency, there must be some sacrifice in cooling efficiency



Two 9- x 314-ft. dry process rotary kilns as viewed from the feed end

with the low volume of air permissible due to low fuel consumption.

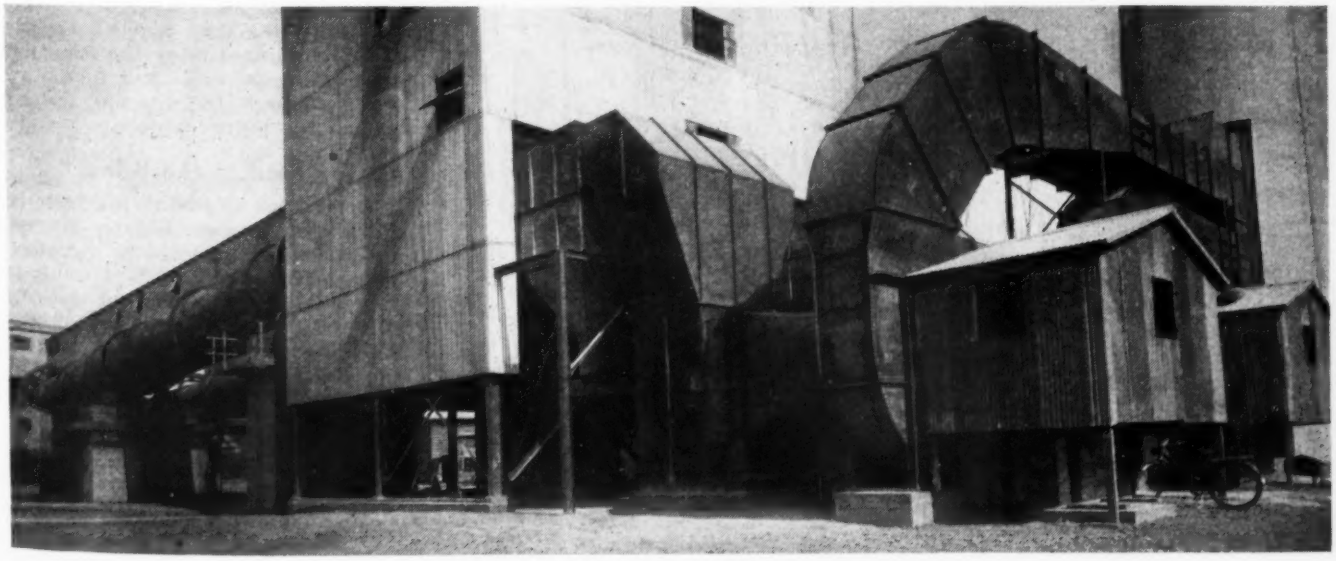
With the exception of 17 ft. in the cooling zone and the cooler discharge, the kilns are lined with 6-in. refractory block for their entire lengths, the lining consisting of 70 per cent alumina brick for 70 ft. in the burning zone followed by 50 per cent alumina brick and with 40 per cent alumina brick at the feed end of the kiln. In addition, each kiln is insulated with 2½ in. of Johns-Manville Superex insulation between the shell and refractory brick for 196.8 ft. of its length, to a point 25 ft. above the calcining zone. The refractory brick have been laid to tie to longitudinal key block, a single row of block at the four quadrants, to keep the insulation from shifting. No signs of insulation failure or breakdown had been detected after the first four months of operation.

Performance of the kilns will be discussed subsequent to a description of the related equipment features of the installation, some of which are new, or relatively so, to the portland cement industry.

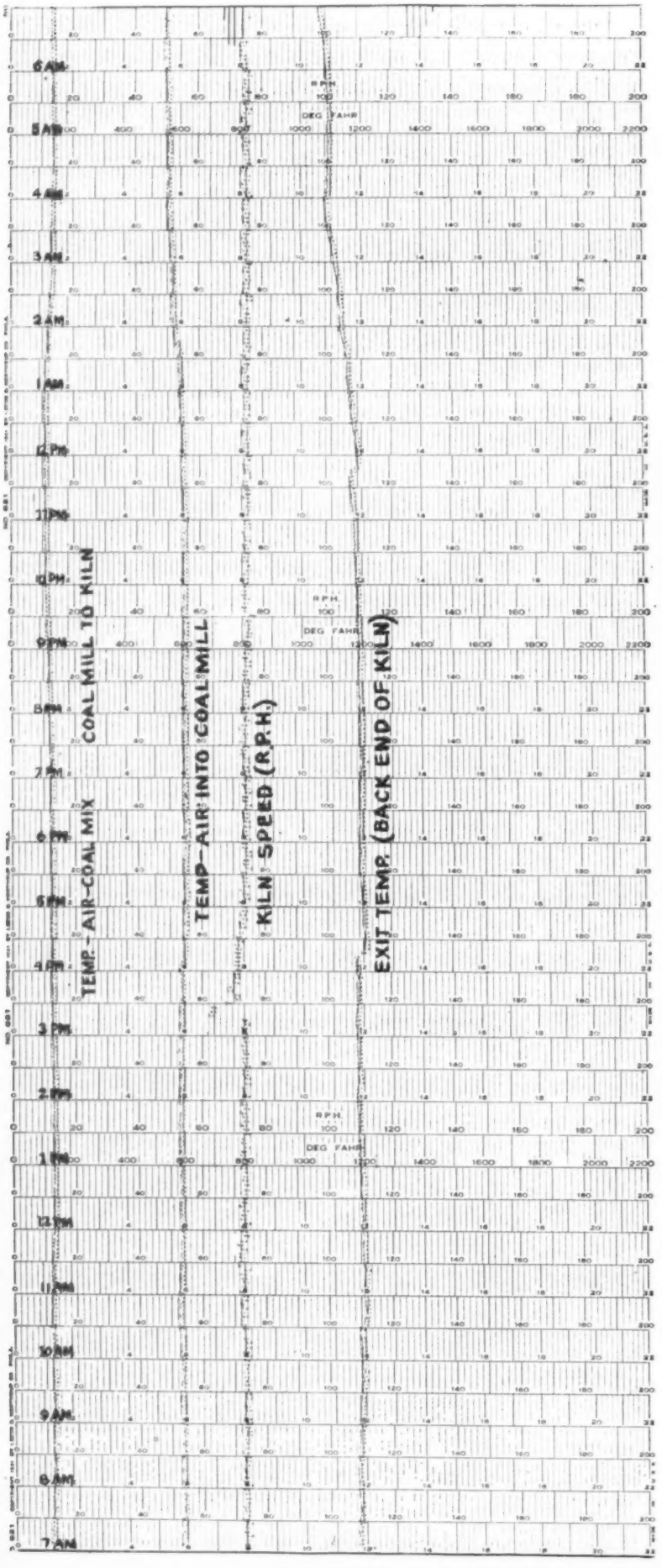
Coal Preparation

The kilns are fired by air-swept unit ball mills which dry the coal as it is ground and inject primary air plus pulverized coal through the kiln burner pipe as one continuous operation. The mills are housed in a separate building adjoining the kiln operator's floor as shown in one of the accompanying elevation drawings. Ball mills were selected to fire the kilns because it was anticipated that relatively uniform results would be attainable with wide variations in moisture content and size of the coal, tempered air from the kiln hood being introduced into the mills at as high temperature as 600 deg. F.

The mill, designated by the manufacturer as the Tirax coal mill, has two compartments and has design features entirely new for firing rotary kilns. It has no trunnions and the drive mechanism is enclosed in a single casing. The mill is supported near the center on a combined slide shoe ring and herringbone gear, the slide shoe ring resting on two self-aligning slide shoes, all enclosed in the single casing. The gear and slide shoe ring are dip lubricated. At the outlet end, the mill is provided with a standard SKF pillow-block guide bearing.



Close-up of exhaust end of kilns, showing dust collectors and induced draft fans



A typical continuously-recorded chart, showing essential data on rotary kiln performance

A herringbone gear drive with the high ratio of reduction attainable by its use will permit the use of relatively small high-speed electric motors. In this installation, a 75-hp. slip ring motor is the drive for a mill carrying 13,290 lb. of forged steel balls, which revolves at 24 r.p.m. and discharges a product 80 per cent minus 200-mesh.

Raw coal is fed each mill from an overhead 45-ton bin through a Merrick feedoweight as shown in the elevation drawing. An air lock is provided in the feed spout just below the feeder. Primary air is taken from the kiln hood in the conventional manner, tempered with cold air and introduced just below the air lock into the feed end of the mill. The primary air and coal are drawn through the mill by a primary air fan, driven by a 25-hp. electric motor, and blown into the kiln through an annular air-cooled blowpipe. Pressure and temperature measurements are made at the inlet to the coal mill and adjustments are accomplished by a damper at the primary air fan and a butterfly valve at the coal feed pipe.

Coal mill operation is regulated either by an automatic feed controller, or manually, according to the extent of variations in size of coal feed and moisture content. Automatic control is effected by a vibratory control unit consisting of a riding contact on a track around the diameter of the mill and an amplifying box which picks up the mill vibrations and transfers through direct current electrical impulse to a Leeds-Northrup controller on the kiln control board. Variations in vibrations induced under overload and underload conditions inside the mill are reflected, when operated under automatc control, in the coal feeder drive.

Primary air leaving the coal mill is held at and not permitted to exceed 170 deg. F., an alarm sounding to indicate when additional tempering cold air must be introduced. The kiln is fired with only 25 to 30 per cent primary air, the only air entering the kiln unpreheated being the tempering air to the coal mills and that introduced through the annular opening around the burner pipe.

Feed to the Kilns

The method of feed of raw material into the kilns is particularly interesting, for it has resulted in a continuously uniform rate of feed which, in combination wth a constant speed of kiln rotation, has contributed to better than ordinary uniformity of product and the absence of surging through the kiln. The type of feeder used was specified and perfected by the Lawrence Portland Cement Company's operating staff based on their past experience.

Raw material is conveyed from the raw grinding mills by a 16-in. screw conveyor to the back end of the two

new kilns where a single enclosed bucket elevator fills separate hoppered-bottom feed bins over each kiln. Feed fineness is 88 per cent minus 200-mesh, ground in open circuit through tube mills, and its temperature is in the neighborhood of 200 deg. F. as fed.

An ordinary adjustable horizontal slide gate is the means of releasing the raw material to the feeder, which consists of two parallel and horizontal 12-in. screw conveyor flights, one superimposed over the other as shown in the accompanying drawing. They measure approximately 25 ft. in length and are housed in standard steel pipe with a clearance of only 1/32 in. between the flight and casing and each flight carries an 8-in. pitch.

The upper flight, driven at constant speed by a 10-hp. motor through a herringbone gear reducer, turns at 37 r.p.m. as compared to an average of 30 r.p.m. for the lower flight which receives its feed from the far end of the upper flight and discharges into the kiln feed spout. Relatively, the upper and lower flights carry 26 tons and 20 tons of dry raw material per hour respectively, the theory being that the flight which actually feeds the kiln be full all the time and under a constant head of material. A surge box superimposed on the upper conveyor flight is a precaution against packing, and an overflow pipe to the raw material bucket elevator takes care of the excess circulating material that cannot transfer to the feeder flight.

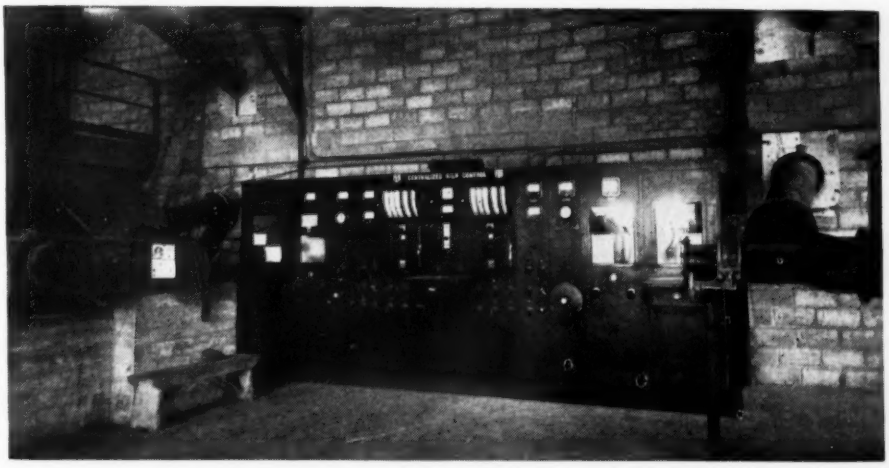
The drive on the lower, or feed, flight, is variable and tied synchronously with the kiln drive through a 7.5- 2.5-hp. D.C. motor and Link-Belt 4:1 P.I.V. gear, for automatic change in speed to conform with changes in kiln speed. Weekly checking of the quantity of raw material put through the feeder indicates unusually precise accuracy. Actual weighing of a sample of about 150 lb., drawn over a period of exactly ten seconds, has regularly conformed within a tolerance of one pound. As stated earlier, the feed spouts into the kilns are submerged to minimize dust pickup by the kiln gases.

Clinker discharged from the Unax cooler at 400 to 450 deg. F. is further reduced in temperature to 185 deg. F. through a 7- x 80-ft. rotary cooler, utilizing McCaslin conveyors.

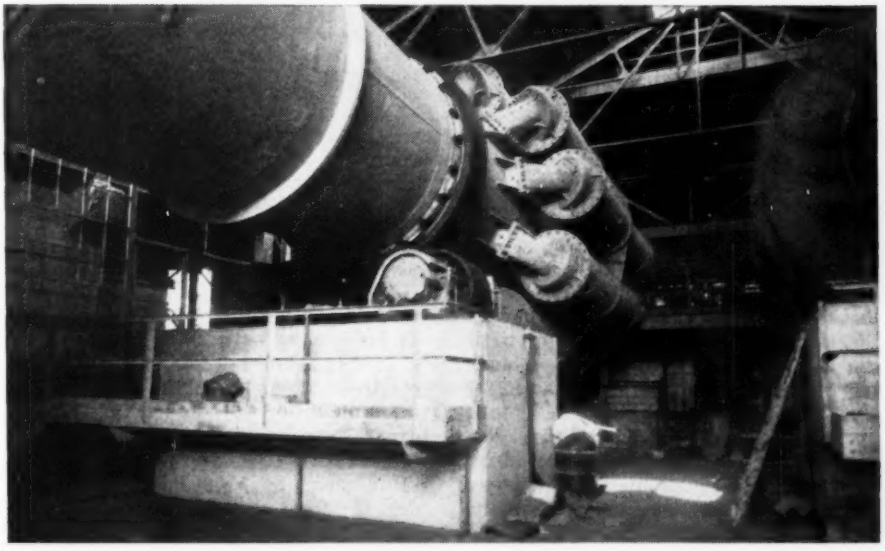
Dust Collection—Draft

The kilns employed induced draft Buffalo fans, built to F. L. Smidth & Co. specifications, driven by 100-hp. squirrel cage motors drawing the gases through collecting chambers, Western Precipitation Multiclone cyclone dust collectors and exhausting through a single 150-ft. Rust Engineering Co. stack measuring 12 ft. inside diameter and tapering to 8 ft. at the top.

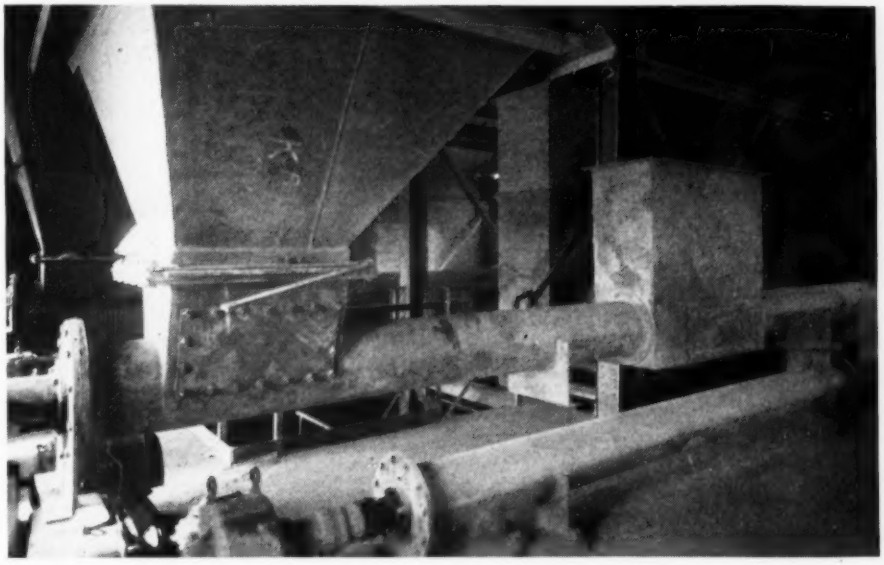
A system of screw conveyors was



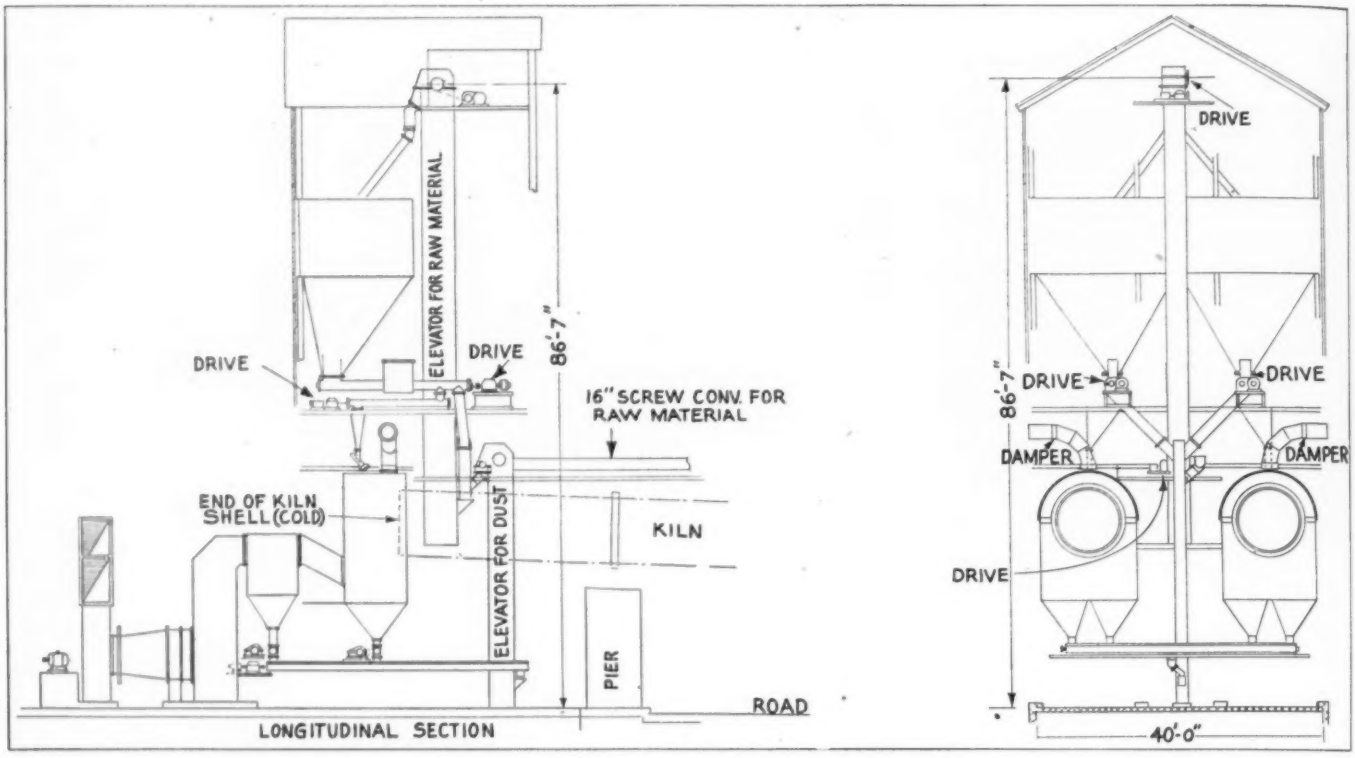
Close-up of electrical control board for operation of the two kilns



Cooler installation on one of the 9- x 314-ft. dry process kilns. Centralized kiln control board is shown between kilns, above



Raw material feeder for one of the two kilns. Upper screw conveyor conveys feed to the right, past surge box, dropping material into lower conveyor (overflow off end to raw material elevator) which conveys, to the left, into kiln. Upper conveyor has greater capacity than lower, maintaining constant head of feed, and thereby uniform kiln feed. Lower screw speed is synchronized electrically with kiln drive

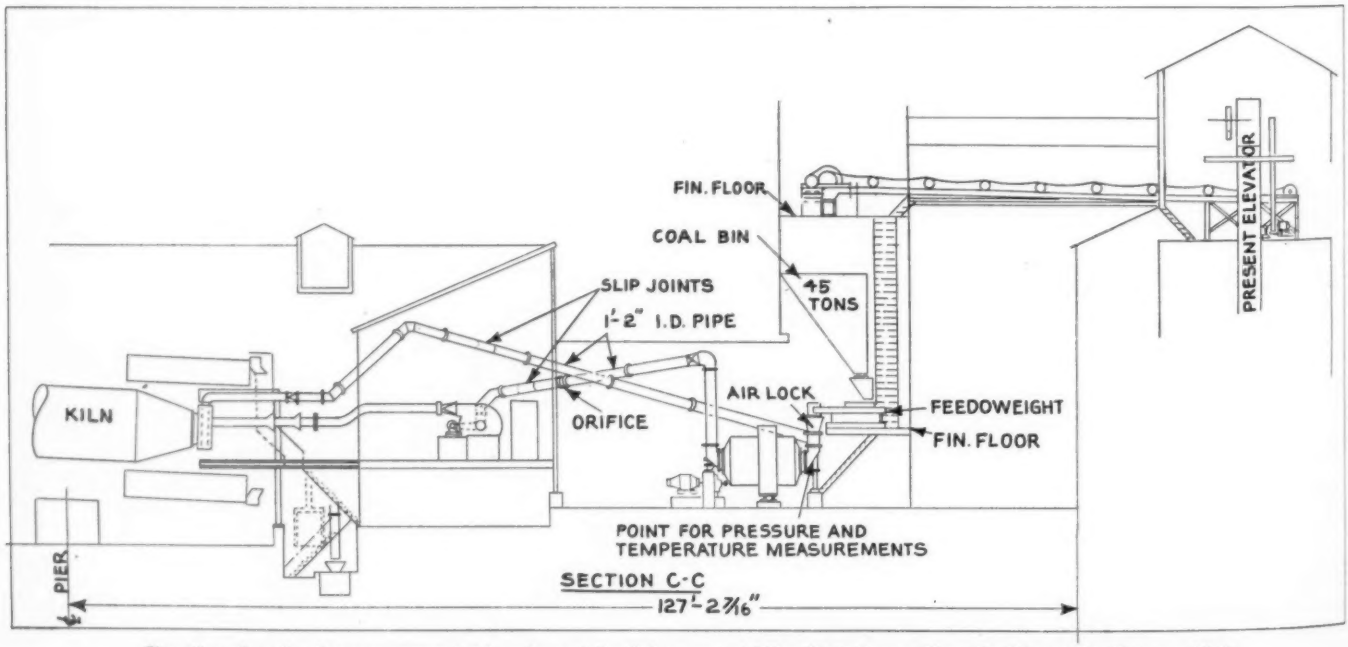


To the left: Longitudinal section view of feed end of kiln. Note how constant, uniform feed is provided by having over-capacity screw conveyor feed second screw conveyor with overflow of first screw being returned in closed circuit by elevator. To the right: End elevation view of feed end

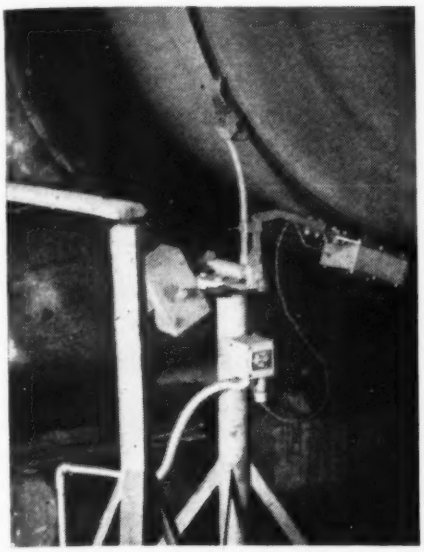
installed to re-introduce the dust into the kilns, through interblending with the raw material in the bucket elevator filling the feed bins, but at present dust from the cyclone collectors and collecting chambers is being discarded. However, the volume of dust collected is low, about six or seven tons per kiln per day, due principally to the fact that an unusually low volume of air is put through the kilns due to the excellent fuel economy. Consumption of air is approximately 2 lb. per lb. of clinker, as compared to 4 lb. or more ordinarily, resulting in low gas velocity through the kilns.

It was found necessary to introduce cooling air at the back end of the kilns in order to protect the induced draft fans against overheating. Exit temperatures at the throat of the kilns measure 1050 deg. F. to 1100 deg. F., and this temperature is reduced, through the bleeding in of air through ports and through the opening provided by removal of the kiln seal ring, to 670 deg. F. in the housing ahead of the Multiclones. A Foxboro vernier valvactor is a means of bleeding air into the kiln housing through the ports.

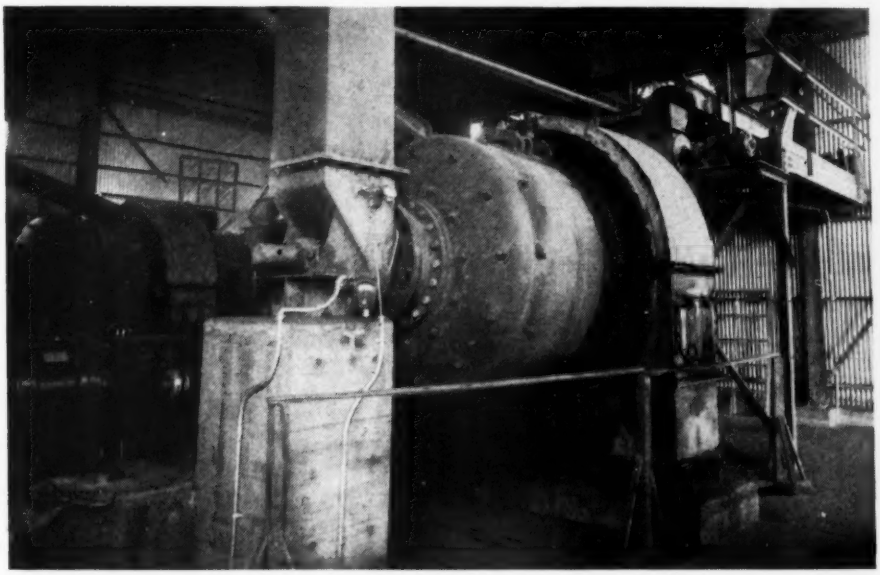
If the temperature within the housing exceeds 670 deg. F. a Parflow temperature controller automatically stops the coal mill, the primary air, the kiln, and stoppage of the feed of raw material into the kiln follows. The induced draft fan, under that condition, will continue to operate until the temperature within the housing drops below 670 deg. F.



Elevation view showing arrangement of equipment for firing cement kilns. Note how uniform feed to coal mill is provided



Vibratory feed control unit for coal mill



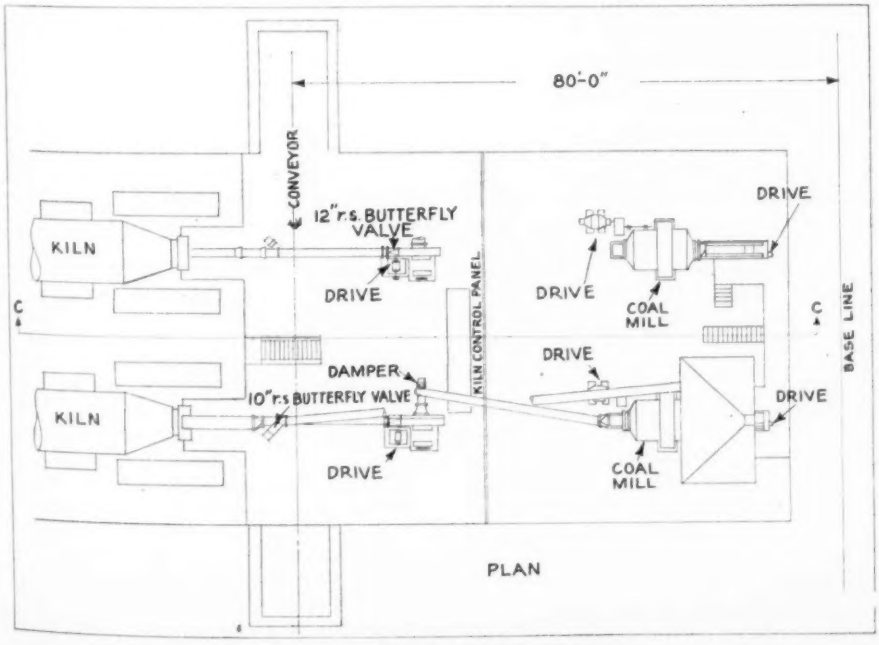
Close-up of one of two ball mills (air-swept) used in firing kiln. Inclined pipe, left background, carries heated air from kiln into right end of mill and vertical pipe, left, carries coal-air into kiln through burner pipe. Coal feed is regulated by feedoweight under bin, tied electrically with vibratory apparatus for regulation of rate. Mill is mounted on "shoes" and is driven through herringbone gears

Kiln Operation—Controls

A Smidth centralized control panel governs the entire operation, complete with recording and indicating instruments and all the starting switches. One continuous master recording chart, for each kiln, records the four most important figures sought; the kiln speed in r.p.h.; the exit temperature at the throat of the kiln; the temperature of the tempered gases at the Multiclones; and the temperature of the air from the coal mill (primary air-coal).

Clinker is burned at 2600 deg. F., with a travel time for material flow through the kiln of four hr., kiln speed being held to 75 r.p.h. The theory of firing is to have a uniform kiln speed and rate of feed, for the purpose of uniformity, the only variable being adjustments in coal feed. The draft as measured at the kiln hood, held to maintain the figure at 0.8 to 1.0 in. of water at the throat of the kiln, is the means of holding a constant temperature at the back end of the kiln, thereby enabling a constant holding point on kiln speed. Clinker is burned with ½-1 per cent of excess air and, as pointed out earlier, with an unusually low volume of gases.

The plant is producing Type I, II and III (A.S.T.M. designation) portland cements and air-entraining cements. The company also operates a wet process plant at Thomaston, Maine, where, for the purpose of comparison, installation of an 11- x 356-ft. kiln was effective in attaining coal consumption of 75-80 lb. per bbl. of clinker. That plant was described in the March, 1947, issue of ROCK PRODUCTS, pp. 70-73.



Plan view of kilns and firing equipment

Boxcar Shortage Eased

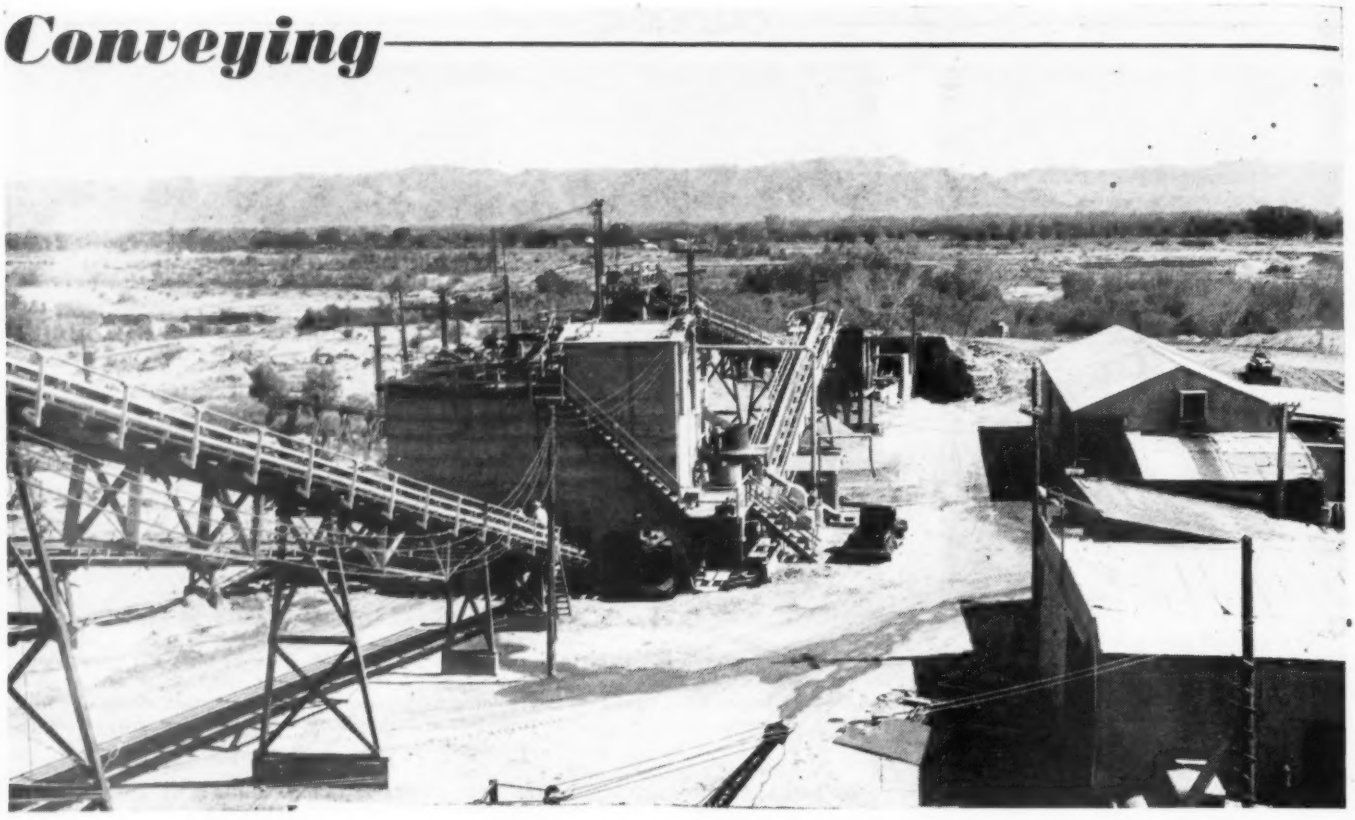
SANFORD G. PRICE, president, Gibsonburg Lime Products Co., Gibsonburg, Ohio, stated recently that the boxcar shortage was being eased by the receipt of grain cars temporarily freed from the eastern seaboard. During the three or four months just past the car shortage had caused severe curtailment and near closing in many plants due to the fact that the processors were unable to ship out their manufactured product. Lime plants are now filling a backlog of orders—some three to four months old.

West Coast Paper To Gypsum

SEATTLE MASTER BUILDERS ASSOCIATION, Seattle, Wash., will send 200 tons of paper monthly to National Gypsum Co., Buffalo, N. Y., in exchange for badly needed wallboard and lath. The northwest has been receiving about 550 thousand feet of the product each month, but has need for three to four times that amount. National Gypsum, because of the paper shortage, has been operating on a five-day week.

Ohio to Create Department of Mines

IT IS EXPECTED that Ohio will pass legislation creating a separate State Department of Mines and Minerals headed by a director with cabinet status. It would place sand, gravel, crushed stone, and clay mining under state supervision.



General view of the washing plant over concrete bins. The primary crusher may be seen in the background below the truck dumping ramp and secondary crushers are to the right of the washing plant

Long Concrete Tunnel Under Stockpile Serves Both Trucks and Conveyor

By W. B. LENHART

SEVERAL unusual features are to be found in the sand and gravel plant of the Arizona Sand and Rock Co. of Phoenix, Ariz., which has been in operation for the past 20 years. One of the departures from standard practice is the use of a large concrete tunnel under ground storage so that large capacity trucks can drive under the pile and load direct via air-electric gates. This tunnel also holds a long 36-in. belt conveyor that delivers aggregate to the company's ready mixed concrete plant across the street from the aggregate producing unit. This 420-ft. tunnel is of reinforced concrete construction and required about 2000 cu. yds. of concrete. It is 16 ft. wide with a 12-ft. clearance, and has a 24-in. roof slab and 18-in. walls. Trucks enter the tunnel at right angles to the long axis via a steep ramp and drive out through a flatter ramp of larger radius.

A second feature of interest is the experimental work that is now going on with a jig designed to make a separation between aggregates of different specific gravity. In the pit run material is some lighter weight aggregate that is acceptable to all state and city consumers and is a high class material in every respect, but one user who will soon supply some 20 miles of large diameter concrete pipe in the area wished to have this lightweight material removed, if possible. The Arizona Sand and Rock Co., basing their judgement on a previous jig installation, designed and built a 4-compartment Hartz-type jig. The plunger for each compartment, about 14- x 24-in. actuates through a controlled-stroke eccentric. The aggregate is flushed into the upper compartment with water and passes on to the next compartment a few inches below the first. The heavier material due to the pulsating action of the jig segregates as a lower stratum and is drawn off through a circular port on the side of each of the sorting compartments. The lighter materials pass entirely through the jig over ½-in. screen cloth and are discharged. Only a small portion of the plant's total tonnage is treated; the jig handles about 15 tons per hour.

In the pit the company uses a 2-cu. yd. Marion (362) dragline that loads to two 20-ton capacity White Diesel trucks equipped with dual drives. The trucks dump to an 8-in. rail grizzly mounted over the crusher hopper. For crushing, a 15- x 36-in. Diamond primary crusher and two Allis-Chalmers No. 636 secondary crushers are employed. All screening is wet with a 4- x 10-ft. Allis-Chalmers low-head, and a 4- x 10-ft. Air-O-Vive vibrating screen doing the classifying. Most of the concrete sand is recovered from two home-made sand drags but recently a third sand drag was installed to receive the overflow from the two first mentioned. Al Carter, the superintendent, says the third drag has recovered 40 to 50 tons of additional sand per day. Incidentally, the increased use of sand for concrete block in the area has made a shortage at the pits, and the company may resort to grinding gravel to produce concrete sand. Plaster sand is recovered on a home-made sand wheel.

The low-head vibrating screen has been in operation five years at this plant, and at times has had 285 tons per hour passing over it, yet not one cent has been spent for repairs to the screen other than cloth changes.

Material for processing is recovered from the old bed of the Salt River. This supply used to be replenished by occasional floods but since dam construction above the plant has removed that possibility, operations are con-

ducted over a relatively wide area. Gravel exists to a considerable depth in the old river bed but gravel increases in size with depth. At present the pit is excavated to a depth of about 25 ft. D. W. Kelley is president of the Arizona Sand and Rock Co., and H. B. McIntosh is engineer.

Increase Kiln Output

(Continued from page 75)

The data in Table 1, below is of great help to better understand the calcination of calcium carbonate, especially a state of equilibrium.

TABLE 1: EQUILIBRIUM PRESSURE FOR CALCIUM CARBONATE*

Temperature Deg. F.	Temperature Deg. C.	Pressure—Millimeters
932	500	0.11
1112	600	2.35
1292	700	25.00
1472	800	168.00
1648	898	760.00
1652	900	773.00
1742	950	1490.00
1832	1000	2710.00

*By Johnston.

The above table shows the dissociation of carbon dioxide from calcium carbonate is imperceptible at low temperatures. However, as the temperature rises, the pressure of the gas increases considerably. Thus, at 500 deg. C., the pressure is equal to 0.11 millimeters of mercury. At the elevated temperature of 898 deg. C., the pressure is reported as 760 mm. of mercury, etc. The equivalents of this pressure (760 mm.) in other units are one atmosphere; or 14.697 p.s.i.; or 29.921 in. of mercury at 0 deg. C.

Keeping the above figures in mind, suppose a lime kiln temperature is 950 deg. C. With normal conditions, according to Table 1, this temperature develops a pressure of 1490 mm. This is equivalent to approximately two atmospheres, or about one atmosphere above atmospheric pressure. Now let us assume conditions were changed, that too many spalls were dumped into the kiln, causing the flow of carbon dioxide gas surrounding the mass of limestone to become restricted so as to develop a pressure of 2710 mm. Then for the discharging gas to work against it, the temperature must be raised to 1000 deg. C., according to Table 1, in order to cause the dissociation of the limestone to go forward. On the other hand, if we exhaust the gas by mechanical means such as the induced draft system, decreasing the pressure from 1490 to 773 mm., then at a temperature of 900 deg. C. dissociation proceeds at the same rate as if the temperature read 950 deg. C.

In other words, at a given temperature the carbon dioxide gas resulting from the dissociation of limestone, develops a definite pressure. When this pressure is increased due to a physical condition within the kiln, the rate of production decreases because the dissociation of calcium carbonate to calcium oxide and carbon dioxide is retarded. Conversely, if the pressure is decreased within certain limits by mechanical means, dissociation goes forward at a faster rate resulting in an increase in quicklime production.

Unusual concrete tunnel under stockpile. Trucks load from gates in roof, to the left, and to the right are chutes to belt conveyor supplying ready mixed concrete plant across the road

Table 2, below, shows the equilibrium pressure for magnesium carbonate.

TABLE 2: EQUILIBRIUM PRESSURE FOR MAGNESIUM CARBONATE†

Temperature Deg. F.	Temperature Deg. C.	Pressure Millimeters
662	350	25
752	400	70
842	450	225
932	500	660
936	503	760
941	505	800
950	510	900

†By Marc and Simek.

Under heating, magnesium carbonate dissociates like calcium carbonate except it has a lower initial dissociation temperature.

Equilibrium pressure table for dolomite, defined as a limestone having equimolecular proportions of calcium and magnesium carbonate, is not given here as there is much confusion as to the dissociation of dolomite. It is, of course, between the two sets of figures given in Table 1 and Table 2.

Summarizing the above, the restriction of carbon dioxide gas slows up the production of quicklime, whereas by exhausting the gas at the proper rate, the production is increased.

Problems in Use of Pumice for Aggregate

PUMICE as aggregate in concrete block manufacture presents definite problems: some closely related to those found in the use of regular aggregate, others peculiar only to pumice. The major problem at the present time is the tendency of pumice to segregate in shipment or when stockpiled.

Commercial production of pumice is as yet a comparatively young industry, and because of relative ease of recovery, very few plants have installed proper equipment for grading the product. The majority of deposits are worked with elevator traps filled by dozers.

The simple solution, on paper, to this problem is of course the proper grading of clean sized aggregate of both coarse and fine mesh at its source. There is very little available data on this subject, but one block manufacturer in eastern Oregon has successfully sized pumice using minus 3/16-in. mesh and plus 3/16 minus ⅜ in. mesh, combining them in a 60 to 40 ratio.

A tendency of the pumice to segregate in the block machine has also been noted, and is apparently due to the low specific gravity of the product, for the fines are made up of volcanic ash or pumicite which has the property of floating on water. This raises the question of the type of machine best adapted to the use of pumice aggregate—a question still to be answered.

Another problem is the length of the curing cycle. Pumice, apparently due to its high porosity, does not cure the same as common sand. The foregoing is discussed at length in a recent publication of the Department of Geology & Mineral Industries of the State of Oregon, prepared by N. S. Wagner, field geologist. The paper also discusses pumice deposits and the extent to which they are worked in the state.

Open Slag Unit

CALLANAN ROAD IMPROVEMENT CO., recently opened a modern slag crushing plant at South Troy, N. Y. Slag will be obtained from the Republic Steel Corporation's blast furnace.

Producing Agricultural Limestone As Cement By-Product

Oregon Portland Cement Co., Portland, Ore., installs additional mill to grind limestone flour and agstone

ENTERING the agricultural limestone field in 1941, the Oregon Portland Cement Co., Portland Ore., for the first four years screened agricultural limestone from the Jeffrey hammer mill. During this time the company was able to feel out the possibilities without undue expenditures. From the inception of the program there was a steady, year-to-year growth until sales volume began to exceed production. To meet this increasing demand, the company installed special grinding and dust collecting equipment in 1945. At this same time, limestone flour was added to the list of salable products. Both these products (agstone and lime-flour, as the latter is called) have continued to increase in tonnages sold.

Making Limestone Flour

Production of limestone flour, while a smaller tonnage, likewise showed a steady growth. Present indications are that sales of both products will continue to grow as the farmers and orchard owners in the district are fast becoming aware of the great advantages that limestone dust offers.

To prepare the increasing tonnage sales of limestone flour, the cement company installed a 4- x 7-ft., Hardinge mill which has the feed controlled through an "electric ear." The electric ear actuates a Model "C" Hardinge constant weight feeder. The ball mill feed is all ½-in. material.

The mill carries a normal ball load of about 18,000 lbs. It will grind close to 12 tons per hour of agstone during the drier months and will turn out 6½ to 7 tons per hour of limestone at a fineness of 75 to 80 per cent minus 200 mesh.

At the start of operations some trouble was encountered due to the water content of the Oswego limestone. Normally this stone ranges from 0.125 to 0.5 per cent water. The climate here is quite humid for most of the year and while the water content was on the average small it was sufficient to cause caking in the older dust recovery system with resulting troubles. To correct these troubles the Oregon Portland Cement Company staff installed a Pangborn dust collector on the vent pipe of the older dust recovery system. No trouble has been encountered since the installation was completed. The collector is mounted over the storage bins and is manually discharged.

In the illustration may be seen the set-up of the entire installation, including the use of the No. 72 loop classifier (9-ft. products collector).

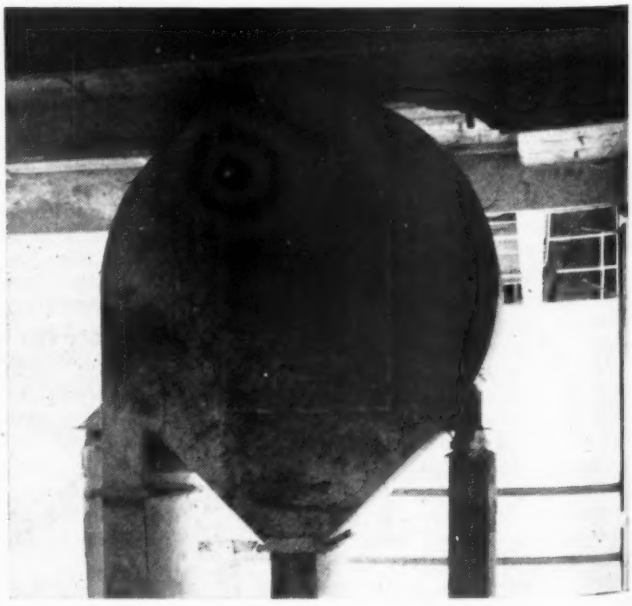
Constant weight feeder for ball mill

It also shows how this device functions. It will be noted that by adjusting the deflecting and classifier control dampers within the loop, a change in fineness of grind can be quickly and easily accomplished.

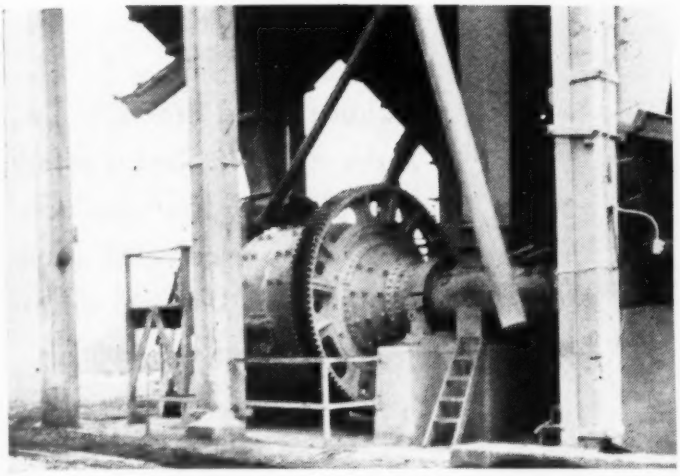
The installation of the Pangborn dust collector on the vent stack allowed more air to enter the grinding system, and resulted in an over-all increase in capacity from 1½ to 2 tons per hour. This increase in capacity was partially due to the larger volume of air entering the system with corresponding increase in evaporation which in turn permitted a wetter material to be ground.

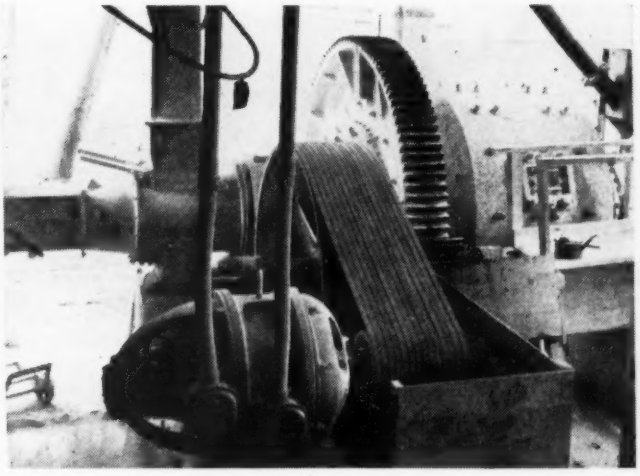
Two products can be secured from the system; the "flour" limestone and the agricultural limestone. The Hardinge mill is driven by a 100-hp., Westinghouse motor through "V" belt drives.

The Oswego agstone has a high calcium content in the 95 per cent $CaCO_3$ range. As the limestone dust is in the



Left: Bottom view of dust collector installation on grinding mill. Right: Loop classifier installation for mill





Left: Mill for grinding agricultural limestone and limestone "flour" with feed controlled by "electric ear." Right: V-belt drive for mill

micron size range and of high calcium content, it is used extensively for commercial feeds, chemical limestone, roofing paper manufacture and other uses.

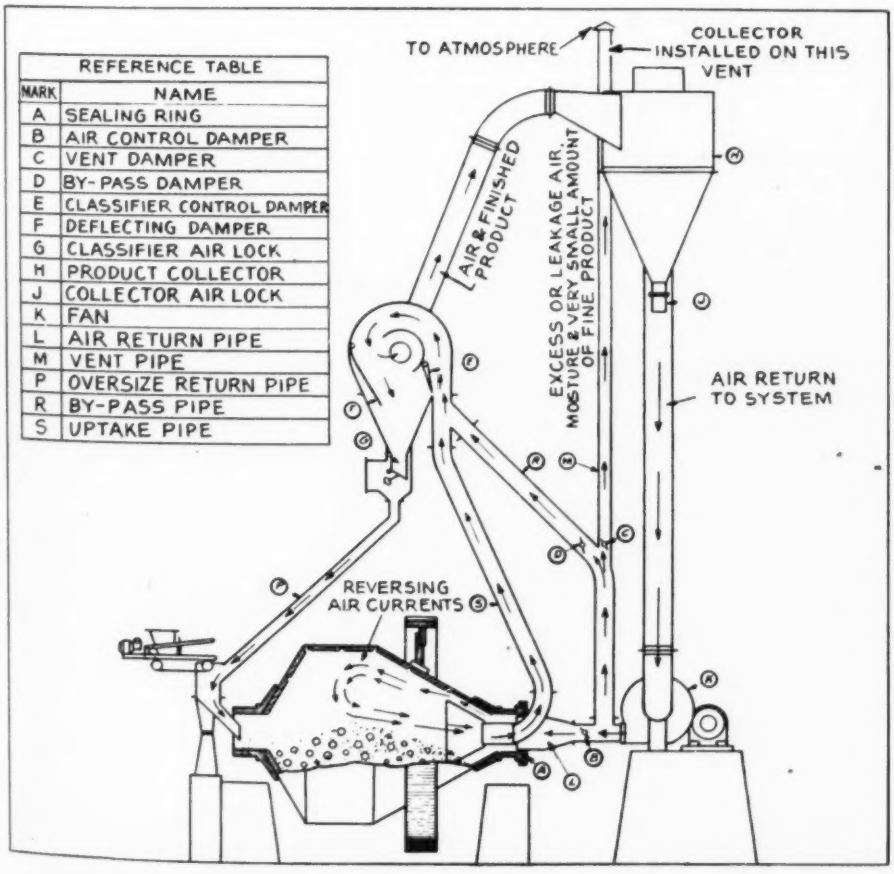
Specifications for agstone in Oregon are as follows:

Minus 10-mesh 99.5%
Minus 50-mesh 65.0
Minus 100-mesh 50.0

These specifications are easily met by this installation.

Sell Sacked and Bulk Products

Situated only a few miles south of Portland, Oregon, the agstone plant is favorably located as the principal producer in the Lower Willamette Valley. About half the company's sales are in paper bags and the balance in bulk. For the latter a local trucking company has five Baughman spreader trucks available, each holding 12 tons of material. The truck is spotted on truck scales and weighed while loading from a flexible spout. Sacked material is sacked on a 2-tube, Bates packer although a 3-tube unit may soon be installed for this work. Some carload business is also handled for sections of Oregon and Washington.



Elevation details of mill and loop classifier with dust collector installed on vent to atmosphere

Due to climatic conditions most of the production is for about seven months per year. According to Mr. Shipley, superintendent, larger production could be gained and sales could be increased accordingly if storage facilities for even 1000 tons were available on the finished side. As it now is, ball mill operation and sales must be closely correlated, and when the rush season is on this problem becomes quite complicated. At present the storage bin capacity is only sufficient for about a 5 hour run.

The sale of the limestone flour is all handled exclusively through the firm of Balfour-Guthrie, Ltd., of Portland, Ore. About 50 per cent of the agstone sales comes through the A.A.A. J. M. Walton is agricultural limestone representative for the company in charge of promotional work and production. H. R. Shipley is superintendent, and D. H. Leche is vice-president.

Iowa Limestone Use

IT IS ESTIMATED in the Iowa state office of the Production and Marketing Administration that 41.8 per cent of the Federal Government's $9,490,000 allocation for soil conservation practices will go for agricultural limestone spreading. Last year the farmers in Iowa spread 3,183,000 tons of agstone.

The next largest amount will go for green manure; and in third place, 12 per cent, will be phosphate fertilizers —both 20 per cent phosphate and rock phosphate. According to PMA the county offices will have to scale down earlier individual payment calculations because approved practices performed call for payments over three million dollars in excess of funds on hand.

New Ready Mix Concern

W. R. HUNTINGTON, Walla Walla, Wash., has started the construction of a ready mixed concrete plant near Clark, just outside the city limits. Two mixer trucks have been purchased, a 4½-cu. yd., and a 3-cu. yd.

To the left is the older agricultural limestone plant, and to the right may be seen the new rotary kiln lime plant

Auburn Lime Products Co., Auburn, Calif., has a rotary lime plant for lime products, and an agricultural limestone plant. Use two different types of stone

By WALTER B. LENHART

Short Kiln With Preheater Steps Up Production

BURNING LIME at the Auburn plant of the Auburn Lime Products Co. started only a few years after gold was discovered in California. Ruins of the old wood-burning kilns near the newer plant still stand and one can conjure fantasies of these early lime producers supplying burned lime to the pioneer gold miner so their meager building needs could be satisfied. The gold mining industry today uses some burned lime as a part of the cyanide process for recovering gold and silver from ores. But the needs of the gold miner for any and all of his lime requirements have long since become secondary. Agricultural lime, lime for the infant but growing steel industry in the West, sugar beet lime, lime flour, hydrated lime—names the '49er probably never dreamed of—these are some of the uses to which West Coast producers are aiming their production schedules to satisfy.

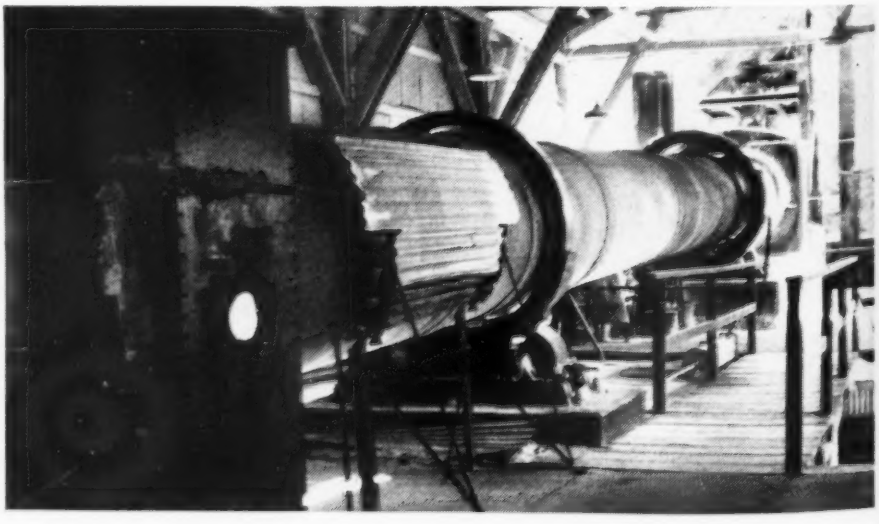
For years, long after the gold rush days were over, operators at this site started crushing and screening limestone for agricultural uses; commercial feeds, chicken grits, agstone, etc., but with indifferent success. During the World Wars some of the equipment was used for processing chrome ore. In 1946 the Resource Engineering Co., 245 California St., San Francisco, took over the property and started a modernization program that will no doubt place the operation among the West Coast's leading producers. New crushing units, a new rotary kiln, and screening facilities have been purchased and are now in operation. A hydrating plant is to be installed along with Raymond grinding equipment for production of hydrated lime. These latter units are expected to be in operation by August of this year.

Lime products are being distributed by the Auburn Lime Distributors, Diablo, Calif.

The plant is located about eight miles south of Auburn, Calif., on the North Fork of the historic American River in the famous "Mother Lode" area where gold mining is still carried on. The nearest rail head is about 6½ miles from the plant.

Quarry Two Types of Limestone

California is liberally endowed with sources of limestone both of the high calcium and dolomitic varieties. But as a general rule the deposits are not flat as in the Eastern sections. Here the materials are tilted at various angles because of earth movements incidental to the many intrusives making up the Coast range and the higher Sierra Nevada mountains. Besides varying in chemical composition, the limestones vary considerably in physical characteristics, probably traceable to these intrusives, and range from recent calcities, to older crystalline marbles, and amorphous limestones. The deposits of the Auburn Lime Products Co. fit into this general pattern. The company has available two main types of limestone. A crystalline variety, secured adjacent to the plant, is used for production of agstone, chicken grits, commercial feeds, and other non-burned lime uses. The other is a dark gray, "amorphous" type which is used for the production of burned lime and related products. This latter variety when seen before burning has a misleading color, but it makes a white product comparable with the best. Both are high calcium limestones being in the



Oil-fired rotary kiln has raw material preheater installation to obtain maximum efficiency

99 per cent $CaCO_3$ range. The crystalline limestone is obtained from the company's own quarries, and the amorphous variety, purchased from the California Rock and Gravel Co., is hauled to the plant by trucks a distance of about 12 miles.

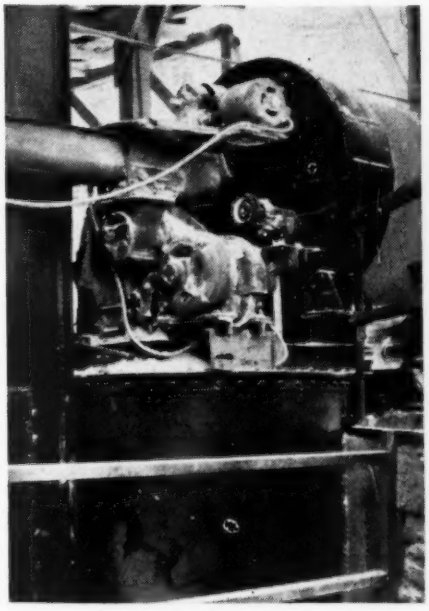
For the crystalline variety, the company is quarrying a portion of a large "U" shaped limestone zone. The present workings follow the most desirable band of limestone in this larger zone and it is about 30 ft. wide. It is fissured by several natural caves of considerable extent with stalagmites and stalactites occurring in profusion. A single face is worked with a height of about 60-ft. using Ingersoll-Rand jackhammers. Air is supplied by a Model AA, Gardner-Denver air compressor driven through "V" belts by a 40-hp., auto-start, ball-bearing U. S. motor. A new Sullivan compressor unit has been ordered to augment the above unit. Loading is done by a ¼-cu. yd. Diesel, P and H shovel, and trucks transport stone to the crushing plant, a haul of about 500 ft.

"Amorphous" stone used for lime in the new plant is all broken to minus 6-in., plus 2-in., and then fed to a No. 50, 10- x 24-in. Kue-Ken balanced type jaw crusher. It delivers a ¾-in. product at the rate of 100 tons per 8 hours and uses a 40-hp. motor. The Kue-Ken discharges to a double-deck 3- x 6-ft. Allis-Chalmers Riplflo screen ahead of the rotary kiln. Three products are separated by this vibrating screen; a plus ¾-in. stone for lime burning, a minus ¼-in., plus 10-mesh product that can be burned if desired, and a minus 10-mesh size which is marketed in bulk for agricultural limestone. Thus the fines are kept out of the rotary kiln. At the time of inspection, the minus ¼-in., plus 10-mesh material was being sent to the rotary kiln. The kiln feeds material from the vibrating screen falls to a horizontal, reciprocating Ajax, No. 10 pan distributor that passes the materials to bins below. This distributor, which is 18 ft. long and 18 in. wide, is supported by several spring-steel legs. Near the feed end of the distributor is a 1-hp. motor that actuates the device, causing it to move horizontally and with an impact in such a fashion that the limestone moves towards the opposite end. It is a very simple and inexpensive device for handling such materials and was supplied by the Ajax Flexible Coupling Co.

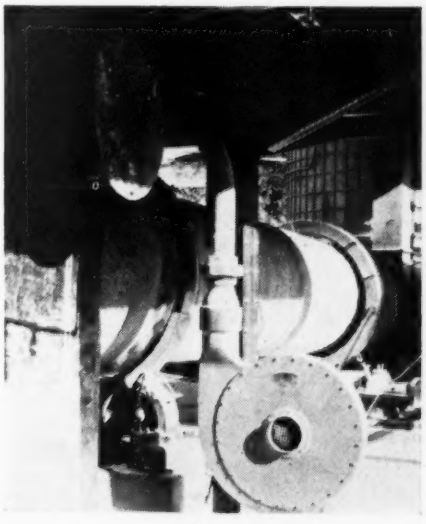
Preheater of Unusual Design

Kiln stone in the bins below is reclaimed by a short, horizontal belt conveyor running alongside the bin. The conveyor delivers to a bucket elevator that discharges to a preheater constructed well above the receiving end of the kiln. The pre-heater consists of a steel housing suitably lined inside for insulation. Inside the housing are a series of special heat resisting cast alloy steel baffles. It is similar somewhat to the Scott kilns used in the quicksilver and magnesite industry. The sized stone is delivered to the top of the pre-heater, filling it completely except where the baffles interpose and deflect the material to form horizontal passageways. The waste heat passes through these openings as well as through the interstices of the ore itself. It is so designed that the waste heat passes through the limestone five times in series. A suitable fan mounted on top of the preheater draws the waste gases through the limestone through a 15-in. OD. steel pipe. The stone moves through the heater by gravity. The operating data is as follows:

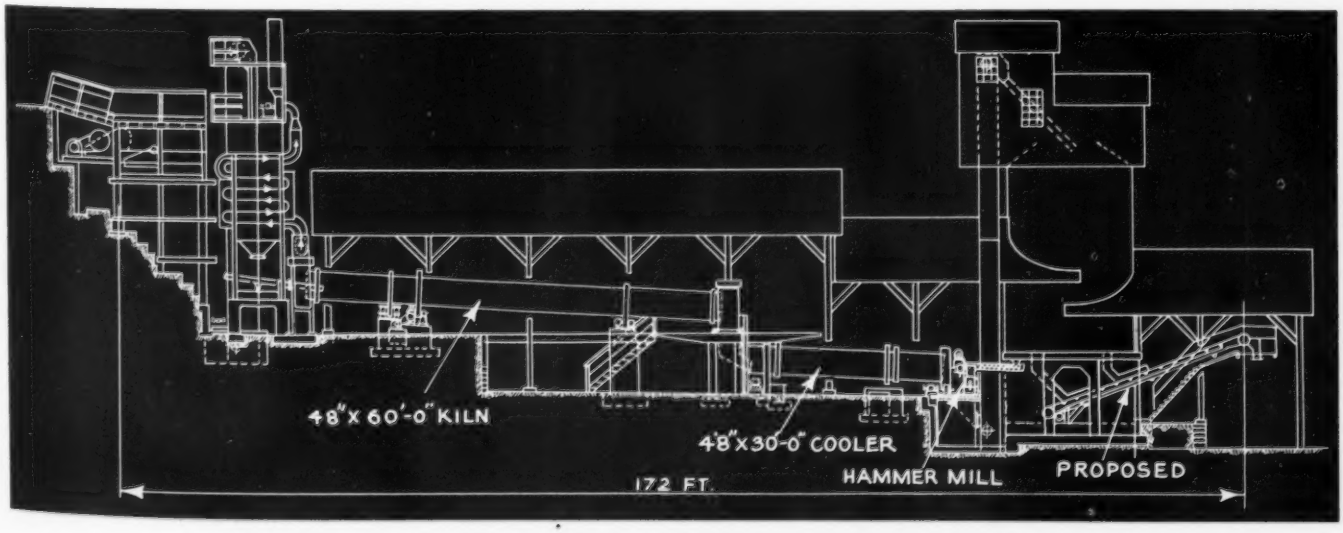
Feed—Minus 1¼-in., plus 8-mesh.
Preheated rock temperature — 875 deg. F.-1000 deg. F.
Preheater gas exit temperature operating on day feed—360 deg. F.
Hot gas from kiln to preheater — 1250 deg. F.-1400 deg. F.
Residence in the preheater — 1½ hours.
Pressure drop through the kiln, ½-in. water.



Hammermill at end of rotary cooler regrinds coarser burned lime for production of "flour" lime



Blower installation alongside cooler



Elevation of rotary lime kiln equipped with new type preheater with provision for a second kiln alongside

Showing how sacked materials are handled on pallets with lift trucks

George L. Kelly, manager, to the left, with R. R. Romo

The pre-heater was designed by Mark Lintz, San Francisco, Calif. Waste heat from the rotary kiln passes up through this device counter-current to the descending crushed limestone. The flow of limestone is deflected by suitable baffles. The installation is too new to give performance data on the pre-heater but we hope later to supply this information. All of the kiln exit gas goes through the preheater.

The rotary kiln is an oil fired, H. W. Gould unit, 4- x 60-ft., lined with high alumina fire brick. Due to the heat conserved by the pre-heater, a short kiln has proven satisfactory. This type of kiln is well known in the quicksilver mining and processing districts and its use in the lime industry is a logical application. Temperatures mantained in the production of mercury are comparable with those used in lime burning, and the necessity for an economical operation is just as important as in lime burning, for mercury ores are, for the most part, of nominal value. The high alumina brick linings were supplied by E. J. Bartells Co.

As previously mentioned, the preheater discharges to the kiln feeder. This feeder is also a development pioneered for the quicksilver industry by H. W. Gould Co. Inasmuch as quicksilver fumes from a furnace are the valued product sought, their recovery and retention is of the highest importance, so this feeder was designed with the intent of retaining and controlling all fumes and vapors that might be lost through the interstices of the ore stream to the furnace. It therefore lends itself to nondissipation of waste heat from a lime burning operation.

The feeder, a pipe-like device about 8 in. in diameter and about 8 ft. long, is mounted almost horizontally. It is connected to the pre-heater (or feed bin) by a suitable, dust-tight opening, yet permits the feeder to move back and forth horizontally. A small motor actuates a cam-like arrangement which causes the feeder to move ahead slowly with its load of limestone, and is then jerked back quickly. Length of stroke and rate of stroke are controllable. In action it resembles the recoil of a field piece. At this operation the feeder delivers a uniform feed at the rate of 40 tons per 24 hours.

Storage facilities for 25,000 gal. of fuel oil are provided. As an oil of high viscosity is used, a small steam boiler supplies steam to pre-heat the oil in the storage tank. The fuel oil gets an additional pre-heating by means of coils built close to the hot end of the kiln so that when the fuel reaches the low pressure burners it has a temperature of 160 deg. F. About 37,000 gal. of fuel oil are used per month. This is delivered to the plant in trucks hauling 5700 gal. per load. Air for the burner is supplied by a General Blower Co. blower.

Furnace temperatures in the kiln are controlled by a Bristol indicating pyrometer augmented by a Foxboro potentiometer with the thermo-couple for the former being installed in the feed end of the kiln. Temperatures recorded at this end are up to 1540 deg. F. The hot end was said to be 3000 deg. F.

Hot lime falls to a 4- x 30-ft. Gould rotary cooler. The cooled lime falls to a small pit at the end of the cooler. Near the top and within this pit is a short screw conveyor that is not encased. The screw delivers or rather pushes the lime to the foot of a bucket elevator that elevates the material to a 3- x 6-ft. double-decked Allis-Chalmers Riplflo screen mounted on top of a 35-ft., circular, 4-compartment silo. The silo has a total capacity of 200 tons. The double-deck screen has a ½-in. top deck and a 16-mesh lower deck. The plus ½-in. lime goes mostly to the steel users. The plus 16-mesh, minus ½-in. goes to one of the bin's compartments; also the minus 16-mesh material. The intermediate sizes (or any size for that matter) can be reclaimed and returned for regrinding to a small Dixie hammer mill mounted over the previously mentioned pit near the end of the rotary cooler. The hammer mill discharges to the pit and the material is again elevated to be re-screened.

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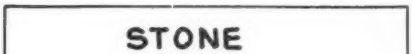


End elevation of preheater for rotary lime kiln, to show numerous passageways for hot gases: (A) Passageways formed by the baffles; (B) Steel housing suitably lined for heat insulation; (C) Heat resisting cast steel alloy baffles

LABOR RELATION TRENDS

Pay for Holidays and Vacations

By NATHAN C. ROCKWOOD

ALL EMPLOYERS are doubtless aware of the present trend toward provisions in new union labor contracts relating to pay for holidays and vacation periods; for as a union goal, this is evidently being pursued with no less persistency and directness than the drive for constantly higher hourly wage rates. That both amount to the same thing is apparent in the announcements about the recent contract between the General Motors Corporation and the C.I.O. automobile workers' union, in which it was made clear that by paying for six holidays a year, the 11½¢ per hour increase allowed was equivalent to 15¢, on the previous pay basis.

With many industries, paid vacation periods for hourly-wage employes are new, but already contracts are being made to provide long-term employes three-week's vacation with pay, whereas, a short time ago, a company was considered liberal to grant one week's vacation with pay. Under the circumstances there is much to be learned from recent interpretations of holiday and vacation contract clauses, by arbitrators called in to settle controversies, in which apparently management has been at fault in not devising iron-clad phraseology. Experience shows that union legal talent is just as alert to take advantage of ambiguous language here as it is to take advantage of faulty wording in overtime-pay clauses.

Holiday Pay, Regardless

In a New York City disputes case, the arbitrator was asked to interpret the following contract clause designed to provide wages for eight annual holidays: "All employes covered by this agreement shall be paid a full day's wages for the following holidays, without being required to work: New Year's day, Washington's birthday, Decoration day, July 4th, Labor day, Election day, Thanksgiving day, Christmas. * * * If any employes are required to work overtime during the week in which any one of the above holidays falls, the holiday shall be considered as a day of eight hours worked by such employes for the purpose of calculating the 40 hours of the week after which overtime rates apply."

The employer contended this provision meant that holiday pay was granted for the purpose of protecting employes from loss of wages which they would have earned except for the holiday; and that as Saturday is outside the work-week provided for in the contract, the employes were not being deprived of pay that they would otherwise have earned, and hence were not entitled to holiday pay, when the holiday fell on a Saturday.

The union's legal talent relied on "the plain language" (incidently prepared by the union) which expressly requires compensation for specified holidays. While Saturday was not a regularly scheduled work day, nevertheless, it was customary for many employes to work Saturday at time-and-a-half. Therefore, the union contended, a fair number of workers sustained a loss of wages by not working on a Saturday that was a holiday.

It appeared from the evidence taken by the arbitrator that a more specific clause, to take care of holidays which did fall on a Saturday or Sunday, was purposely omitted, although a previous contract had provided for payment whether or not the holiday came on Saturday or Sunday. [Apparently, each side thought it was putting one over on the other, although the explanation the arbitrator obtained was that neither party anticipated a holiday might fall on a Saturday.]

The specific issue was payment for Saturday, February 22, 1947, Washington's birthday, and the arbitrator decided in favor of the union, that the employes were entitled to receive a day's pay under "the plain language" of the contract clause.

But No Triple Pay!

A dispute in San Francisco presents a slightly different version of sharp practice. Here the contract provided for double-time pay for work performed on Saturdays, Sundays and certain specified holidays. One clause provided that "employes covered by this agreement who have 400 or more working hours' service with the employer shall be granted time off with full straight-time pay (8 hours) for each holiday" (specified) * * * "except in case of extreme emergency, and in that event the provisions of Section 3 (double-time pay) are to apply." Another clause read: "The above provisions shall not disturb any more favorable conditions that may be in effect, nor shall established classifications be disturbed during the life of this agreement, except by mutual consent."

The union claimed that by virtue of this last clause, and the clauses preceding it, that the employes who did work on a holiday were entitled to double-time pay plus the straight-time pay, they would have gotten any way if they hadn't worked.

In this case, the arbitrator instead of quibbling over the phraseology, as has been done in so many similar instances, attempted to find out the intent of the parties to the contract. After studying this angle, the arbitrator came to the conclusion that at the time the contract was signed neither party contemplated such a result. While recognizing the strength of the union's contention that the employer's interpretation could result in his getting a holiday worked for no extra premium, the arbitrator decided against the employes' collecting triple pay — lacking a clear agreement to that effect.

The General Motors Corporation has tried to guard against such ambiguities by providing: (1) the employe has the necessary seniority as of the date of the holiday; (2) the employe would otherwise be scheduled to work on that day, if it were not a holiday; and (3) the employe must have worked the last scheduled work day prior to, and the next scheduled work day after, such holiday, within the employe's scheduled work week.

Vacation Provisions

Exercise of caution in avoiding careless wording of vacation-with-pay clauses is equally necessary. For example, an employer company nationally known for its liberal employe relations was made defendant in a dispute over the meaning of "regularly scheduled work-week" in connection with computing vacation pay. The clause in question read: "Vacation pay shall be computed by multiplying the number of hours in *the regularly scheduled work-week* by the straight-time hourly rate of pay, but shall in no event be less than forty nor more than forty-eight hours' pay * * *."

The controversy arose over the meaning of the five words emphasized, after the work-week had been shortened from 48 hours during the war to 40 hours. The company contended that the term "regularly scheduled work-week" should be interpreted to mean the schedule in effect when the vacation time became due, and was in existence within a reasonable period just prior to that date, since the employes would thus receive no less and no more than they would have earned had there been no vacations.

The union contended that the "regularly scheduled work-week" should be the average of all the weeks worked in the year prior to their vacation time (which would have included some 48-hour weeks). The theory behind this was that "vacations are not a bonus or a gift from management, nor are they given for 'recreation' or restoration of expended powers in anticipation of future exertion. They are compensation for work performed. In equity, therefore, the vacation pay should be in exact ratio to energy expended, on the theory of compensation for work performed."

The arbitrators admitted the seriousness of the union's contention that to accept the company's interpretation would open the way for the company to "manipulate the scheduled work-week, so as to decrease vacation pay," but found no evidence of such manipulation in this instance. So, with one member of a board of three

(Continued on page 125)

Recent Progress In

SAND Classification

By NATHAN C. ROCKWOOD

ALTHOUGH THE FUNDAMENTAL principles of sand classification do not change, and these have been adequately covered in past issues of ROCK PRODUCTS, there is steady progress in the application of these principles. Recent descriptive articles on plants, and some correspondence of the writer, therefore supply data for the following summary, which is intended to emphasize certain trends, and explain some recent practical applications of theory, rather to present much that is new or novel.

Unscrambled Terminology

The more we have studied sand classification problems, the more we are convinced that some of the difficulty in solving plant operating problems has resulted from confusing the separate operations of washing, classifiying and dewatering. These terms have been used in the literature rather indiscriminately, which is easily understood, for the same devices are frequently used for all three operations, sometimes all at the same time. An example of this is the common use of screws, rakes and sand drags for all three kinds of processing.

The first step, then, in planning an operation, or a change in a present operation, is to decide which of the three functions of a device chosen to do a job is to be its primary processing one. For example, a scrubber is ordinarily used for the single purpose of washing—of loosening, clay, loam and organic matter from the sand. There is no classification in the ordinary scrubbing or washing operation in a cylindrical scrubber or on a screen, because the clay and soil removed usually continue with the sand throughout the rest of the processing. This may be an advantage in hindered-settling classifiers, whose action resembles heavy-media flotation in that they are designed to slow up the settling rate of low specific gravity particles by providing a medium with fine particles in suspension, and hence a liquid of greater specific gravity (or density) than clear water. This method of classification as applied in the sand and gravel industry ordinarily is better adapted to relatively coarse materials than to fine sand, unless the hydraulic water is very carefully controlled. "Hydraulic water," as probably the majority of readers know, is the clean water injected from below, designed both to clean the settling particles, and to keep the finer materials in suspension, and thus to form the hindered-settling medium to remove lignite, shale, etc.

A counter-current washer, however, can do a classification job of separating sand from clay, loam, and similar impurities. By controlling the amount of water used, the amount of fine sand lost with the soil water overflow can be partly controlled, and if desirable this fine material itself can be classified later in a hydraulic separator of some kind to recover most of the fine sand, in which case, of course, more water for diluting the pulp (the mixture of fine sand, silt, clay, etc.) would be required. This appears to be the most feasible solution of a washing and classification problem where a relatively high percentage of clay and soil impurities must be removed.

In place of a counter-current washer, one can use drags, screws, rakes, sand wheels and similar devices, where the percentage of clay, etc., is not too high, since, as Shaw pointed out, their action is similar to counter-current washing, in that the material to be washed is dragged or pushed through water, instead of the current of water being forced through the material. In using screws, drags, rakes and sand wheels, however, it has been our observation that operators are apt to view them more particularly as washing and dewatering devices than as classifiers, and it is not feasible to perform all three operations in one and the same device, as they are usually installed.

Washing Often Loses Too Much Fines

Many originally dry-pit operations, that have been converted to dredge-pumping, keep their belt conveyors for handling the material from the dredge discharge to the plant, which usually is some distance from the extended pit operation. That is the economic thing to do because there is no argument about belt-conveyor transportation being lower in cost than pumping long distances and to elevated screens. This necessarily involves a preliminary dewatering process.

The dewatering operation offers a fine opportunity to do a good initial washing job, because it is usual to discharge the dredged material into a sump or tank, with an overflow weir, and to dip the settled material out with a sand wheel, chain of buckets, or similar device. This makes the receiving hopper or tank a counter-current washer, within Shaw's definition. Almost invariably in such a set-

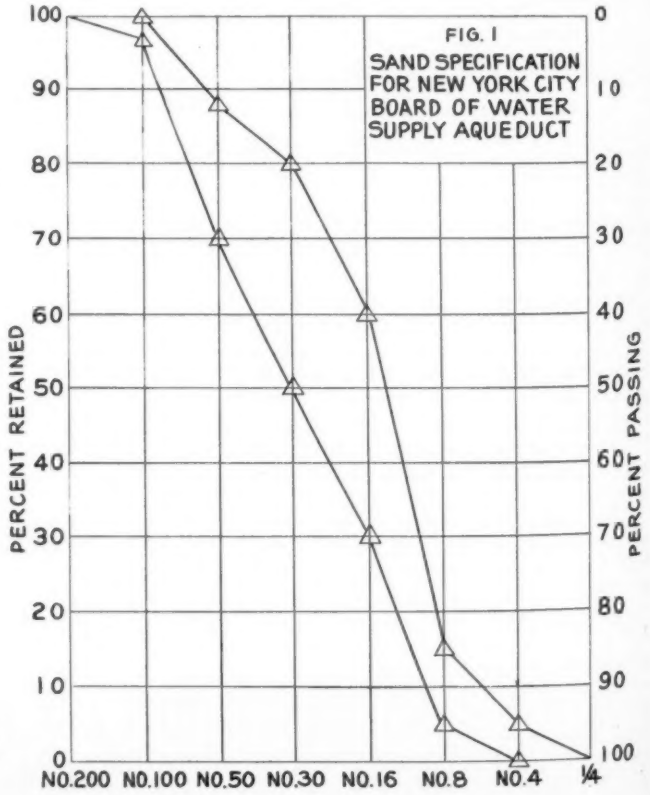


Fig. 1: Sand specification for New York City Board of Water Supply Aqueduct

up, the washing operation is altogether too thorough; that is, the volume of water handled is too great for the design of the basin, and practically all the recoverable fine sand is overflowed and lost right here. The operator will often say there are no fines in his deposit. It is true, of course, that there are few fines fed to his plant classifiers, but that is not because they are lacking in the deposit, but obviously because he has discarded them before they ever reach the plant.

The solution of this problem is usually neither difficult nor expensive. Of course, much depends on the volume of water and materials handled, and this will be considered farther on, but in general there are at least three ways of keeping the fine sand. The first step, ordinarily, is to separate the gravel from the sand. This is usually done anyway by passing the dredge discharge over a grizzly or vibrating screens, for the gravel separated from sand, of course, is easily dewatered. The sand then goes to the settling hopper or tank.

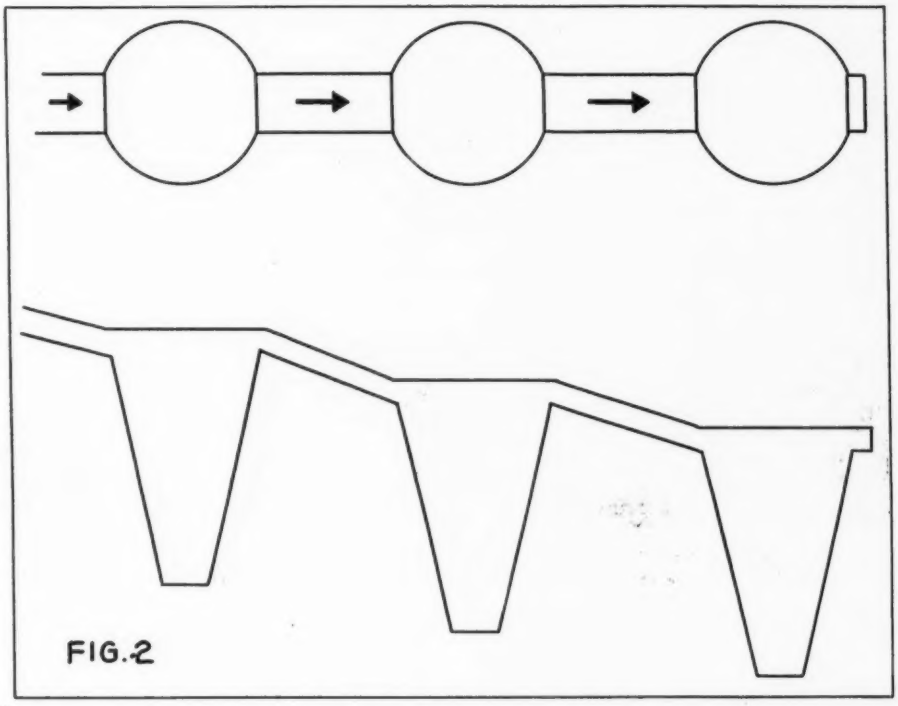


Fig. 2: Original cone classifier layout

Ways to Save Fine Sand

First, and it seems to us that the most logical and the simplest way to keep the fine sand in the plant feed, is to use the dredge discharge hopper (it may be a dump-car or truck hopper just as well) as a true hydraulic separator. In other words, make it big enough to settle the finest sand grains it is desired to recover. Thus the soil and dirty water are removed and disposed of at the beginning of the process instead of at the end. Not many plants have been designed to do this, but the Rosoff Sand and Gravel Co. operation at Marlboro, N. Y., to furnish aggregate for the New York Water Supply Aqueduct is an example, and the results were entirely satisfactory. This operation was described by James R. Norton in ROCK PRODUCTS, March, 1941.

The sand had to meet the following specification:

Passing ¼-in.	100 per cent
Passing No. 4.....	95-100 per cent
Passing No. 8.....	85- 95 per cent
Passing No. 16.....	40- 70 per cent
Passing No. 30.....	20- 50 per cent
Passing No. 50.....	12- 30 per cent
Passing No. 100.....	0- 3 per cent

The accompanying graph shows a plot of this specification, which is a rather peculiar one, evidently designed to meet a shortage of No. 8 and a surplus of Nos. 16 and 30.

The deposit contained enough of all the required sizes to meet this specification. This was carefully determined in advance by test pits 200 ft. apart, dug to a depth of 25 ft., but the locations for recovering the various sizes, including the coarse aggregate, had to be selected and the primary mixture made in the feed hopper of the plant. The next essential steps were (1) a rotary grizzly, (2) a primary crusher, (3) a surge bin, (4) a scalping screen, (5) two sand screens, (6) the minus ¼-in. going to a hydroseparator, 24 ft. in diameter, 6½-ft. deep, (7) the spigot discharge of the hydroseparator going to a rake "classifier" 9- x 25½-ft., set at a 2¼-in. per ft. slope.

The hydroseparator was controlled to make a separation at plus 200-mesh, and the rake classifier, which here served primarily as a dewaterer and blending device, made a separation at plus 100-mesh, retaining however a small percentage of the minus 100-mesh. The hydroseparator handled a feed of 180 tons per hour, and its spigot discharge contained 50 to 60 per cent of water by weight. The total volume of water used in the entire plant was 2500 g.p.m. Since this water was applied on screens and in scrubbers as well as to the classifiers it is not known how much was applied in each part of the processing, but to make a separation in the hydroseparator at about 200-mesh would require considerable dilution.

We can arrive at the approximate amount of water used in the hydroseparator as follows: The settling rate of a plus 200-mesh minus 180-mesh grain is something like 0.15 in. per sec. The radius of the hydroseparator is 12 ft., or say 11 ft. effective (taking out the space occupied by the inlet

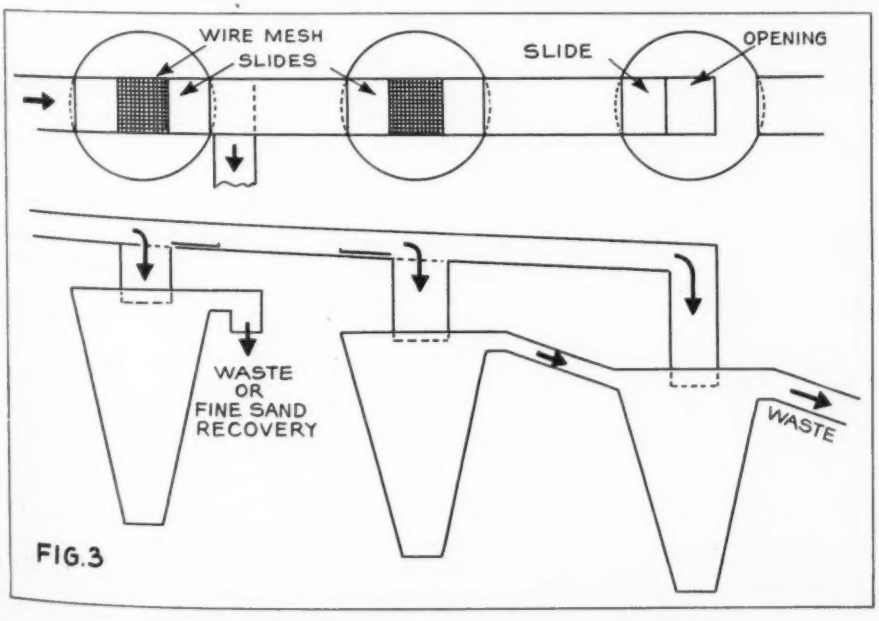
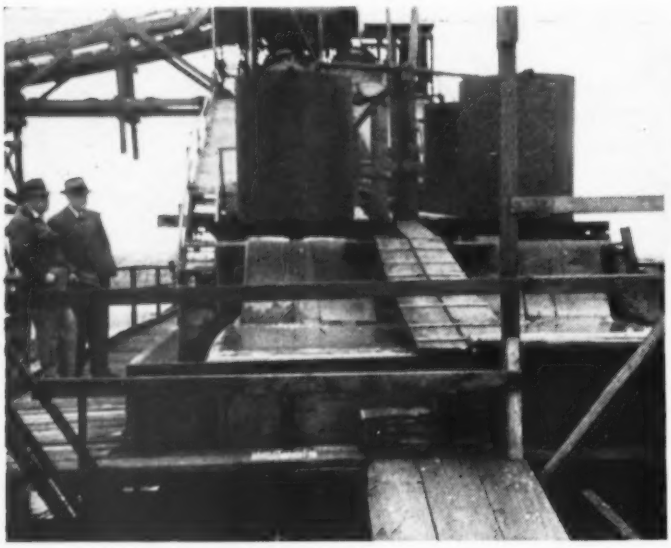
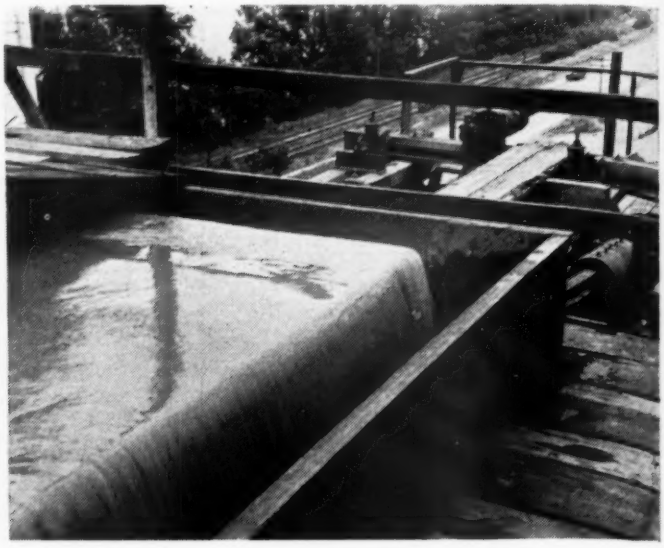


Fig. 3: Revamped cone classifier layout to recover more fines





Figs. 6 and 7: A sand settling tank that recovers fines. Baffles made of old rubber belting (see Fig. 8) at the end of the launder from the screens prevent entrance velocity. A weir extending around three sides of the tank cuts down head on the weir and reduces overflow velocity

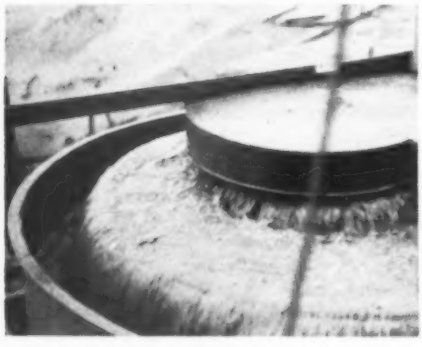


Fig. 5: Showing too much flow to save fine sand—a common fault

pipe). The weir over which the overflow occurs is the entire circumference of the hydroseparator tank, or $24\pi = 75.4$ ft. The Francis formula for the flow over a weir is $Q = VA$ or $(V \times L \times H)$, where $L =$ the length of the weir, in this case 75.4 ft., and H is the height of the water level above the weir (the head on the weir). We do not know either Q or H, but we can determine H indirectly by finding what velocity V is required for a 200-mesh particle to fall 1 in. in a horizontal distance of 11 ft. Since the head is bound to be very small, probably 1 in. is enough to allow for the particle to fall below the effect of the surface current. Actually, the particle would not fall as fast 0.15 in. in a pulp with the specific gravity of this feed (probably about 1.1), but our falling rate of this size of particle, based merely on published tables, is not sufficiently accurate to justify correcting it by 10 per cent (0.15 would become 0.16).

The time required for a particle to settle 1 in. would therefore be about 7 sec., and the current over the weir must not exceed $\frac{11}{7} = 1.6$ ft. per sec. The head on a weir over which water is flowing at 1.6 ft. per sec. thus may be found from the formula $Q = VA$, where $A =$ the area through which the water flows; $A = 75.4 \times H$ in sq. ft. The formula for Velocity, V, is $\sqrt{2gH}$, or approximately $8\sqrt{H}$. Since we know that the maximum velocity allowable is 1.6 ft. per sec., we can determine H from the formula by transposing, $H = \left(\frac{V}{8}\right)^2$, which gives H = 0.04 ft., approximately, or about ½ in.

Then $Q = VA$
$= 1.6 \times 75.4 \times 0.04$
$= 4.8$ cu. ft. per sec.
$= 288$ cu. ft. per min.
$= 2160$ g.p.m.

The spigot discharge of the hydroseparator had approximately 50 per cent by weight of water, which is $\frac{180}{2}$ or 90 tons of water per hour, which is 21,600 gal. per hr., approximately 360 g.p.m. This makes the total amount of water accounted for slightly in excess of the 2500 g.p.m., which included not only the hydroseparator feed, but any additional water required for the rake classifier and subsequent operations. Hence, our estimate of 2160 g.p.m. is a bit on the liberal side, and probably is nearer 1800, since the Francis formula is known to give from 10 to 20 per cent

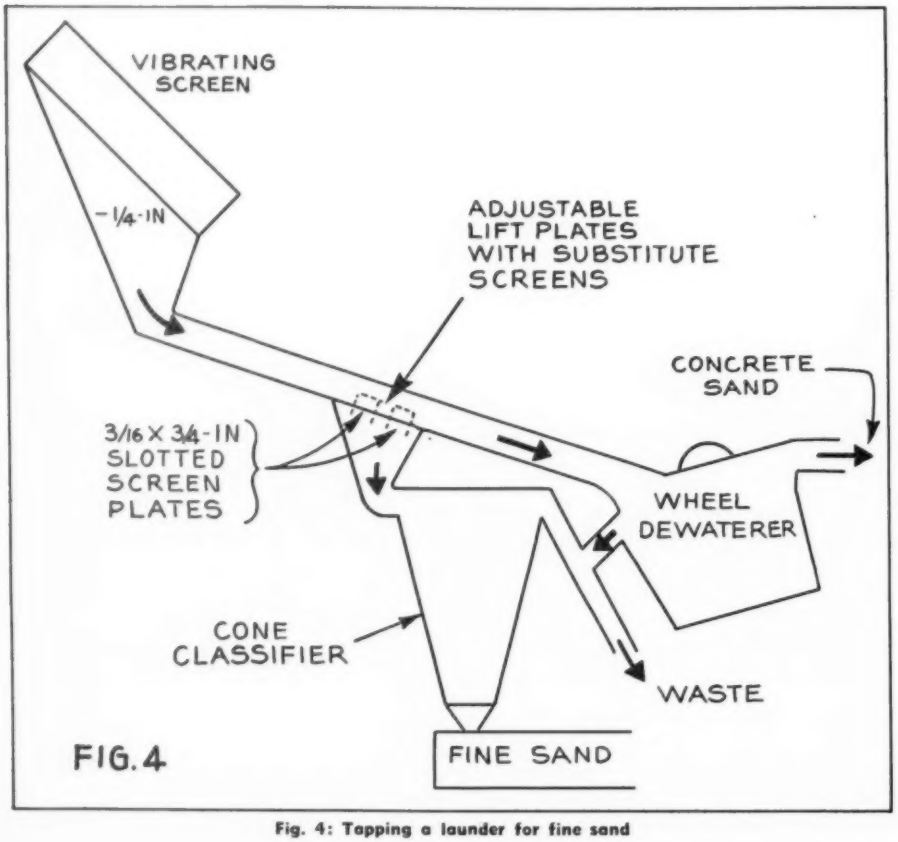


Fig. 4: Tapping a launder for fine sand

over-estimates for such low heads.

The dilution of a feed of 180 tons of solids with 1800 + 360 (or 2160) g.p.m. would be about 540 tons of water for 180 tons of solids, or a 3 to 1 dilution on a weight basis, or more than a 5 to 1 dilution on a volume basis, as used in the sand and gravel dredging industry, taking sand at 110 lbs. per cu. ft., and water at 62.5 lbs. per cu. ft. The problem might have been worked out in reverse order, after having decided that a 3 to 1 dilution (by weight) would be required, and hence determining the size of the hydroseparator tank necessary to handle this volume of water at an overflow velocity which would prevent wasting anything larger than 200-mesh particles. That, undoubtedly was the way in which the installation was designed. We wish merely to analyze an existing operation to demonstrate the factors involved.

Fig. 8: Baffles of old belting, and note the smooth unrippled surface of the settling tank; a tank to catch fine sand should always show such a surface as evidence of a low weir head and absence of turbulence

Repumping and Blending Fines

A second method to recover the wasted fines is obvious. It is simply to overflow the washing pit into another settling basin, or sump, and to recover there as much of the settled fine sand as may be necessary. Since the wash pit, or dewatering tank, is usually at ground level, it may be necessary to pump the settled material from the sump to the plant classifiers, but this can be a fairly thick slurry containing as high as 50 per cent solids, using a sand or slurry pump, fed by gravity, rather than a suction pump. Probably there is more of these fines than required at many operations, and pump need not be a large one.

With this method the real problem will come in attempting to blend this fine sand with the concrete or masonry sands made in the plant classifiers. If the amount is small and the flow regular, some operators merely discharge the fines thus recovered directly into the sand bins along with the products of the plant classifiers. This may result in some segregation, but usually both products are so saturated that a satisfactory blending takes place in the shipping bin. It is often futile to add this fine material to the feed of already overloaded plant classifiers, for they will merely reject it again. We have seen this happening in some operations. It is not satisfactory to add the fines on top of coarser sand on a loading-out belt conveyor, because little blending is accomplished. If the sand is subsequently rehandled several times, it may get by, but car-load tests at the shipping point are fairly certain to show non-uniformity and some segregation.

Revamping Plant Classifiers

The third method of recovering fines is the one probably that will have to be adopted in most present operations because it requires the least redesigning and new construction. In this case it is assumed that all the pit-product is delivered to washers and screens in the plant, and that the usual practice of fluming or laundering the wash water and dirt and sand to classifiers is practiced.

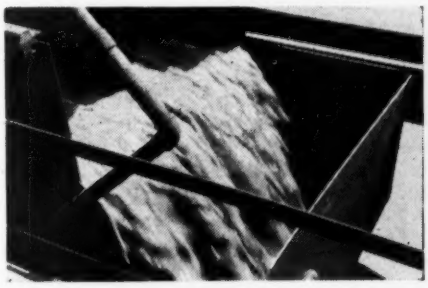
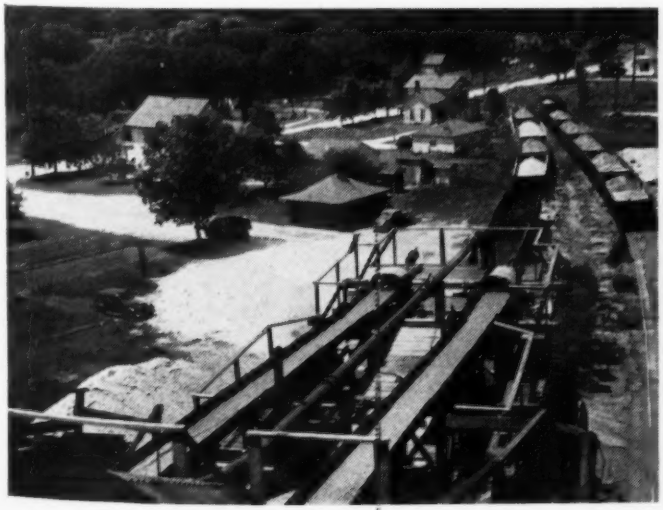


Fig. 11: Overflow from a Shaw classifier, illustrating how a great deal of valuable sand is wasted due to overfeeding and too high overflow velocity

It will be assumed also that no difficulty is encountered in settling out the coarser sands, but that somehow



Figs. 9 and 10 show the installation illustrated in Fig. 3, after change in feeding the cone classifiers was made

Fig. 12: Hundreds of thousands of tons of good concrete sand that overflowed the classifiers, one of which was shown in Fig. 11

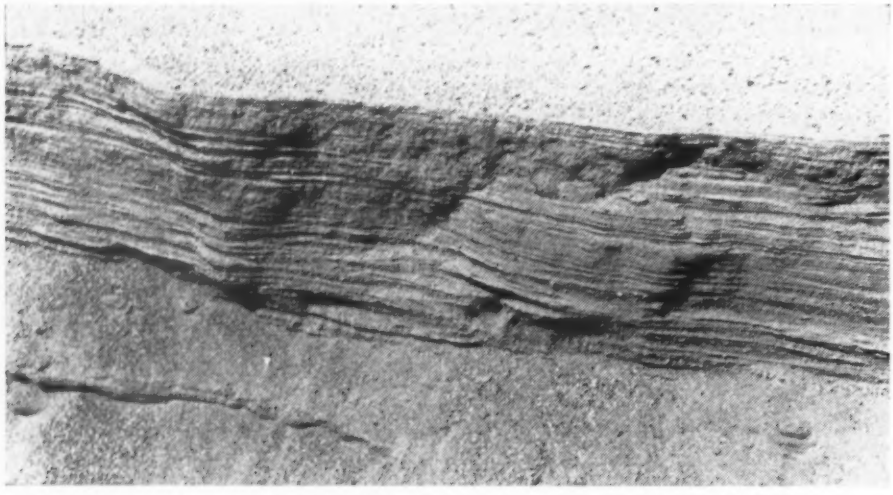


Fig. 13: A close-up of the wasted sand showing how it was stratified (classified) by the waste wash water. Each strata starts with coarse sand, and as the stream bed builds up and the current slows, finer and finer material is deposited on top. Finally, the channel shifts to lower places, and when the new channels are all brought to the level of the old, the whole process of deposition starts over again. A fine place to study the habits of streams!

all the needed fine sand is missing in the finished product.

Cones, tilting sand tanks and similar devices used in most plants as classifiers usually fail to recover fines because of over-feeding for the length of overflow weir installed with them. The pulp (mixture of dirt, sand and water) often rushes through such settling devices at too great a velocity to catch even any great amount of the coarser sizes, as well losing practically all the fines. The usual method of feeding the classifiers is in series, with steeply inclined launders between. The first tank in the series is expected to retain the coarsest sand, the next a finer sand, etc., each succeeding tank taking the overflow of the one preceding it. The result is that except for the relatively small amount of feed water retained in each tank, they all take practically the full load. We have seen results improved greatly by merely changing the method of feeding a series of three cones, as shown in the accompanying sketches.

Instead of feeding from the top cone to the second, and from the second to the third, the launder had openings in the bottom, covered with a wire-mesh screen, over the first two cones, but no screen over the opening into the third cone. The feed for the third cone also includes the overflow from the second. All the openings referred to in the launder bottom could be closed, or the size of the opening regulated, by slide plates.

By feeding the cones in this manner the principles of the hydraulics of running streams are applied, and the cones are prevented from being overworked, or overloaded. In the gently sloping launder over the tops of the cones (and this slope can also be adjusted) the coarse sand particles are dragging on the bottom. The friction of the screen mesh and the sliding plate, further retard the bottom velocity of the current over the cone, and the coarse material, and some dirty water of course, drop through. The first cone, therefore, merely completes the classifying, and does the final washing by separating the remaining mud from this coarse material. Where it was overloaded before it is now able to handle efficiently about half as much feed, and this feed is already practically classified; so much so that the overflow is usually wasted. The second cone takes about half of the rest of the feed, but instead of taking it with a high initial or incoming horizontal velocity, as before, it comes down vertically and hence with no initial horizontal velocity. This is very important, when

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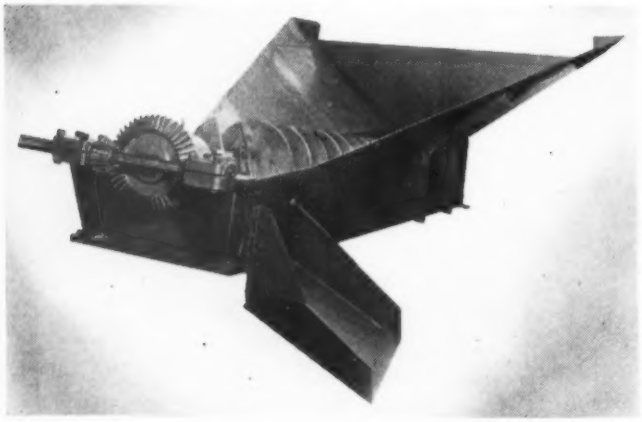


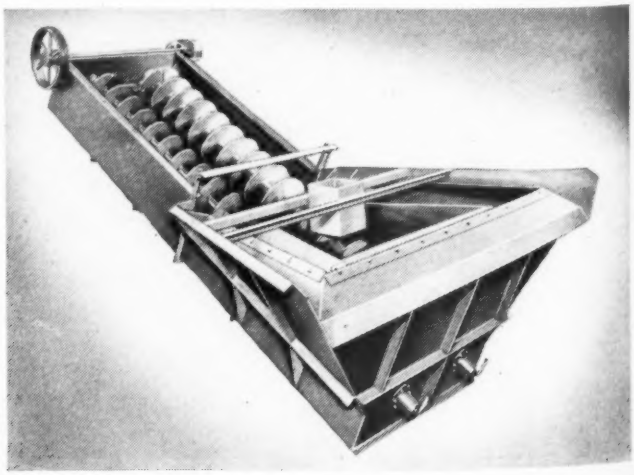


Fig. 14: Example of a screw washer-classifier with extended weir to save fine sand. Fig. 15: A twin-screw washer-classifier with weir around three sides, adjustable weir lip and overflow screens, built to retain fines

Processing Industrial Sands From River Deposits

By ERWIN C. HOEMAN* and ROBERT C. REDFIELD†

Foreword: Limitations of space and paper do not permit a complete report of the interesting and valuable paper by the authors on the possibilities of recovering and processing industrial sands from the San Jacinto River, Harris County, Texas. Studies were made of sands dredged from this river, covering granular properties, sieve analyses, grain properties for foundry and filter sand purposes, and chemical analyses for glass sand, and laboratory beneficiation methods were developed for the removal of impurities to bring the sand up to standards which would meet specifications for glass sand, foundry sand, filter sand, and sand-lime brick aggregate. This study should prove to be very useful for those producers contemplating the production of industrial sand from river deposits.

SAMPLES of San Jacinto River sand consist essentially of subangular to rounded grains of quartz. Magnetite was present in small amounts as tiny, rounded grains. Black, brown and red chert grains were present in quantities sufficient to give the entire sand a light brown color. These grains of chert owed their color to carbonaceous matter, iron oxide, and titanium oxide in solid solution. Very small amounts of feldspar and traces of tourmaline and chalcedony were also present. The table which follows gives the chemical analyses of the San Jacinto River sand composite, on the basis of the original sand and washed sand sized on a No. 100 sieve, compared with specifications for the chemical composition of glass sands.

Selected washed and sized sand, sample 1, equals plate-glass sand purity with respect to the iron content, but it appears that the average sand would not be purer than that required for window glass. Attempts were made, therefore, to improve the quality of the sand by several methods of beneficiation.

Structural sands are not often considered for glass-sand use because sands of this type are usually a mixture of pure and impure quartz grains. The chert grains contain impurities in solid solution but otherwise have much the same physical properties as the pure quartz grains. Impurities in solid solution can not be removed by any practical means, and the grains containing the impurities can not be separated from the purer grains by any of the usual methods unless the iron content is sufficient to make them magnetic. The chert grains in the San Jacinto sand are nonmagnetic. It appeared that there might be differences in conductivity that would permit separation by electrostatic means, but qualitative trials with an excited ebonite rod were not successful.

As might be expected from the origin of this sand, which received a natural scrubbing during transportation and deposition in the stream bed, the grains were unstained. The sand samples contained 1 or 2 per cent of clay that was readily removed by washing, and it usually occurred in the samples as sizeable lumps rather than as material adhering directly to the sand grains. Magnetite in the samples was effectively removed by dry magnetic separation in a high-intensity separator. Tabling was also effective in separating the magnetite.

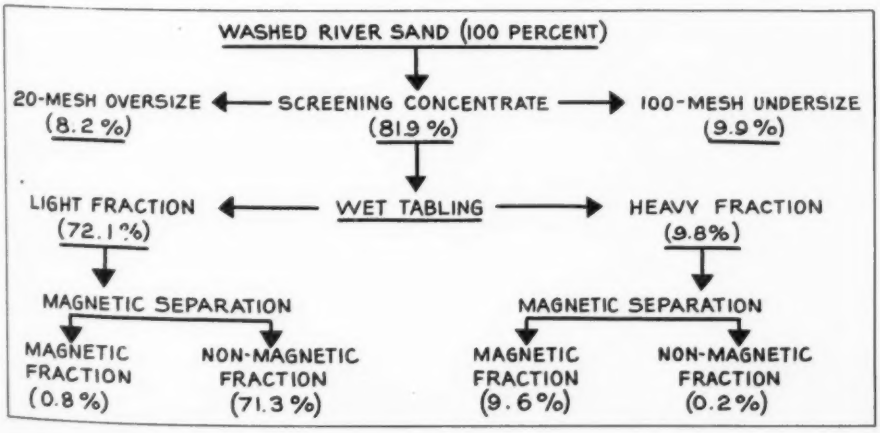
The initial scheme of beneficiation included washing, screening, tabling, and magnetic separation. The flowsheet and the results obtained by the treatment are shown, as follows:

Chemical Analyses of San Jacinto River Sand

Sample	Analysis (ignited basis), per cent: SiO_2	Fe_2O_3	TiO_2	Al_2O_3	CaO and MgO	Others
(original sand)						
1	97.72	0.12	1.81	0.05	0.10	0.20
2	96.76	0.18	1.68	0.14	0.10	1.14
3	94.98	0.18	0.92	0.20	0.10	3.62
Composite	96.49	0.16	1.47	0.13	0.10	1.65
(washed and sized sand)						
1	97.65	0.06	1.29	0.15	0.10	0.75
2	98.43	0.14	0.86	0.15	0.10	0.32
3	98.50	0.12	1.14	0.05	0.10	0.09
Composite	98.19	0.11	1.10	0.12	0.10	0.38

Glass Sand Specifications

	SiO_2 minimum	Fe_2O_3 maximum	CaO and MgO maximum	Al_2O_3 maximum
Optical glass	99.8	0.02	0.1	0.1
First quality flint glass	98.5	0.035	0.2	0.5
Second quality flint glass	95.0	0.035	0.5	4.0
First quality plate glass	98.5	0.06	0.5	0.5
Second quality plate glass	95.0	0.06	0.5	4.0
First quality window glass	98.5	0.3	0.5	0.5
Second quality window glass	95.0	0.3	0.5	4.0
First quality amber glass	98.5	1.0	0.5	0.5
Second quality amber glass	95.0	1.0	0.5	4.0



Flow sheet showing beneficiation of river deposit for industrial sand

Sieve Analysis, Per cent retained on U. S. sieve No.:

0	20	0
4.8	30	6.8
11.8	40	16.6
19.4	50	26.0
34.0	70	30.0
27.8	100	19.6
1.6	140	0.2
0.4	200	0
0	270	0
0	Pan	0.4
0.2	Clay	0.4

(Continued on page 116)

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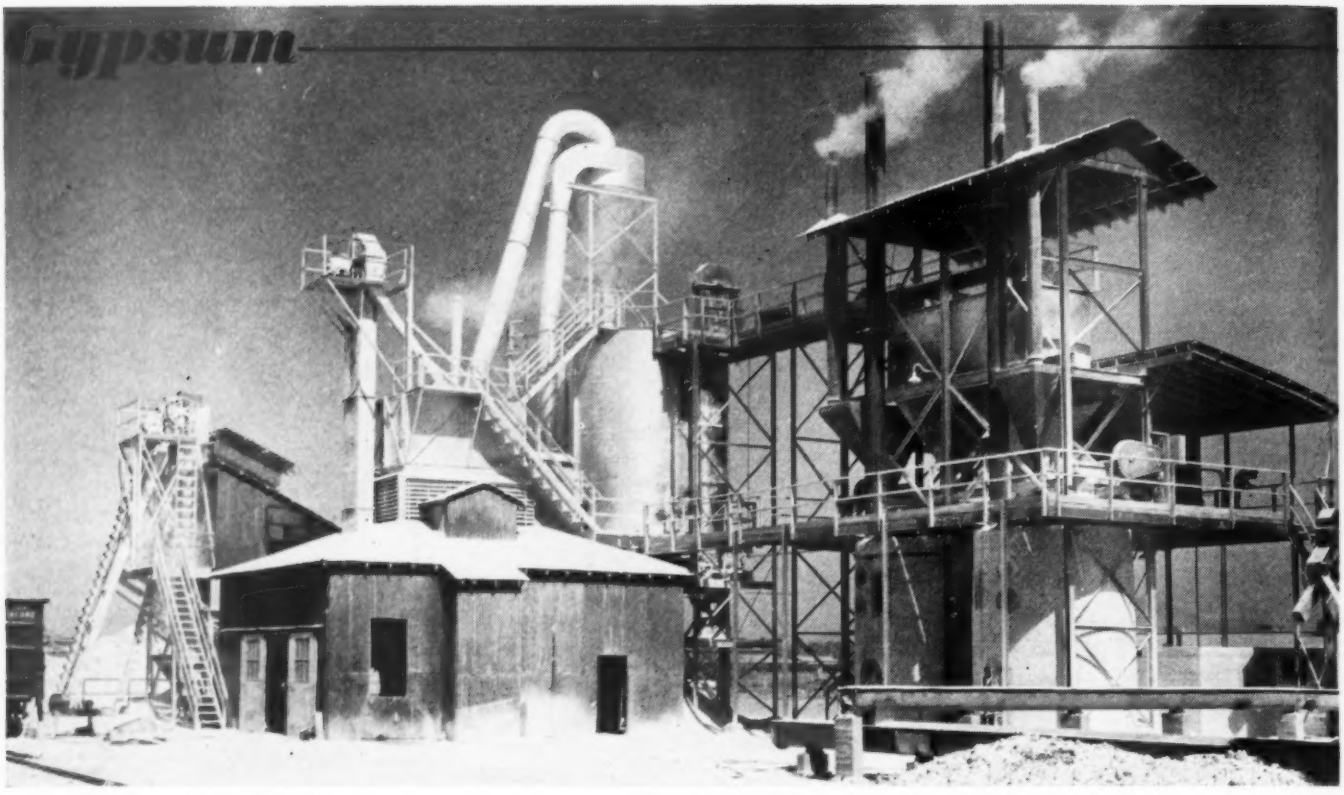
†Mining Engineer, Bureau of Mines, U. S. Department of the Interior, Austin, Texas.



View of plant from railroad siding. Bucket elevator takes raw gypsum rock from hopper below track after it has been reduced in primary jaw crusher. It is further reduced in a secondary jaw crusher before it is elevated in enclosed bucket elevator to surge bin feeding pulverizing mill. To the right are the two calcining kettles

Southwest's Newest Plaster Mill

Union Plaster Co., Phoenix, Ariz., making gypsum plaster and agricultural product

INCREASING population and industrial activity in the southwest have boosted demands for building materials to all-time levels. Realizing the need for additional gypsum plaster capacity, Carlton M. Rogers and his associates formed the Union Plaster Co., Phoenix, Ariz., way back in 1937. However, plans for construction were not completed until 1942 when the country was plunged into war.

A fine deposit of gypsum rock had been acquired in the mountains of Arizona which exploration revealed to contain in excess of 40,000,000 tons of raw gypsum. Work had to be suspended until January 1946, but in spite of priorities and shortages in materials and machinery the mill was set up and full scale plaster production started on September 1, 1946.

At the quarry, rock gypsum is blasted and loaded by power shovel onto trucks for transportation to the company's loading ramp adjacent to the Southern Pacific Railroad where it is loaded into gondola, bottom-dump cars for the short haul to the processing plant in Phoenix.

Crushing and Pulverizing

Cars are dumped into a 50-ton car hopper below the track from which the rock is fed to a 24- x 36-in. J. B. Ehrsam & Sons jaw crusher which reduces it below 6 in. This primary crusher product is elevated by bucket elevator to a 100-ton storage bin adjacent to a Pacific 8- x 15-in. jaw crusher for further reduction before passing to another surge bin which feeds the two 5-roll, low-side Raymond mills where the gypsum rock is pulverized. The pulverized product then flows from the cyclones into two steel silos, each of 150 tons capacity, supported on a steel superstructure with a loading out platform below. Chutes extend out over this platform from the bottom of the bins to permit gravity loading of finely ground gypsum rock into trucks for agricultural gypsum. Beneath the steel bins equipped with draw-off gates is a 12-in. Link-Belt screw conveyor arranged so that it can be fed from either or both bins and convey the raw pulverized rock to the boot of an enclosed Stephen-Adamson bucket elevator. This elevator feeds another horizontal 12-in. Link-Belt screw conveyor which moves the ground gypsum into two 12-ton surge bins feeding the two Ehrsam gypsum calcining kettles fired by gas burners. After the cooking period the calcined gypsum gravitates into the hot pits of concrete and steel construction. Kettles are emp-

Officials of plaster company: Left to right: Chas. J. Reuscher, office manager; Buster Teague, chief chemist; Carlton M. Rogers, president; W. W. Alexander, chief engineer and assistant secretary-treasurer; Doyle Tate, mill foreman; and Lamar Hicks, sales manager

tied eight times in 24 hours or a total of 16 kettle batches a day.

Plaster Mill

From the hot pits, the calcined gypsum, or stucco, is taken by 12-in. Link-Belt reclaiming screw conveyors and from thence by a short bucket elevator and another above-ground screw conveyor into the plaster mill building where it is stored in four 100-ton steel bins. From the 400-ton storage bins, the stucco is drawn by chute into a 12-in. Link-Belt screw conveyor, elevated and dropped into a one-ton Ehrsam weighing hopper to which fiber and retarder are added before mixing in the Ehrsam mixer prior to sacking. Samples are continuously being taken to the laboratory for checking as to set and quality so as to insure constant uniformity. Sacked plaster is moved by hand trucks to the storage warehouse where it can be shipped out conveniently by truck or rail on either the Southern Pacific or Santa Fe.

In addition to plaster the company sells, either sacked or in bulk, a large volume of agricultural gypsum, which is the pulverized raw gypsum rock ground to minus 100-mesh.

The overall length of the plant is some 600 ft., with the main mill and storage building nearly 300 ft. long. The main building houses the stucco storage bins, mixing and sacking departments, the chemical laboratory, storage warehouse, and plant office.

Carlton M. Rogers, president of the company has been associated a number of years prior to the war with the Pacific Rock & Gravel Company of Los Angeles. W. W. Alexander, chief engineer and secretary-treasurer, has had years of experience in the plastering industry and related fields. Lamar Hicks, sales manager, has been identified with the building material trades in Arizona for over a quarter of a century. Buster Teague, chief chemist, was formerly associated with the Pacific Portland Cement Co. Charles Reuscher, office manager, joined the company shortly after his release from the Army. Doyle Tate, mill foreman, is a native of Texas.

Bagging machine for finished plaster is operated in three shifts, 24 hr. a day

Record Lake Movement of Limestone

A REPORT released from Cleveland, Ohio, states that the lake movement of limestone hung up a new record. The 1946 total of 17,551,555 tons was greater than for any of the war years except 1941 and 1942.

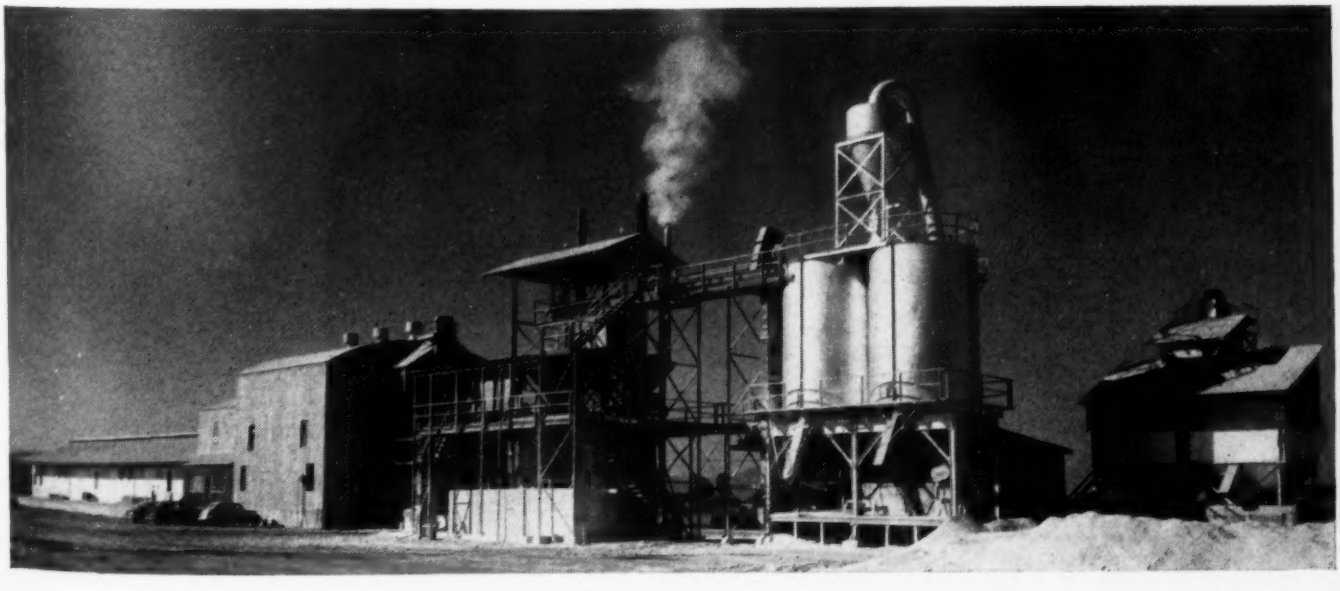
Wisconsin Agstone Law

PRODUCERS of agricultural limestone in Wisconsin must deliver products under three grade specifications; top quality, standard, and sub-standard. Under the law, either the crushing plant or the contract distributor who sells the agricultural limestone must register with the State Deparment of Agriculture. The Department will test samples for fineness and neutralizing value.

Fight Lime Dust Case

MARBLEHEAD LIME CO., Chicago, Ill., has been confronted with a dust abatement case at its Calumet district plant. The company has been charged with violating a city ordinance dealing with public nuisances by its alleged "failure to control the large volume of lime dust emitting from the stacks." The company officials have explained to authorities plans for relieving the condition.

Looking toward mill building with raw storage to the extreme right, followed by raw grinding building and bins, calcining kettles, mill building, offices, laboratory, and warehouse



Research Points to Widening Markets for Lime

National Lime Association convention at Hot Springs, Va., continues popular Operating Division sessions

THE 29TH ANNUAL CONVENTION of the National Lime Association, held May 5 and 6, at The Homestead, Hot Springs, Va., and the third annual meeting of its Operating Division, immediately following on May 7 and 8, drew an attendance of 122, including the ladies, to hear a wide variety of papers and to interchange practical ideas on lime plant operation.

Business affairs of the Association were transacted the first day, followed by papers considering the railroad car supply, lime's role in correcting stream pollution, water-conditioning practices, the manufacture of chemical lime, and concluding with a session on the subject of research. Proceedings of the Operating Division are reported separately in this issue.

Officers

H. D. BRIGSTOCKE, Thomasville Stone and Lime Co., Thomasville, Penn., was elected president and chairman of the board of directors for the fiscal year 1947-48; Robert Boynton was elected general manager and treasurer; Mrs. Roma M. Turpen, was elected secretary; and Miss Gladys McBee, assistant secretary.

Elected to the board of directors at a meeting preceding the convention were C. C. Loomis, New England Lime Co., District 1; H. D. Brigstocke, E. D. Williams, of H. E. Millard Lime and Stone Co., and B. L. Corson, G. & W. H. Corson, Inc., District 2; A. B. Miner, National Gypsum Co., R. L. Dickey, The Kelley Island Lime and Transport Co., and R. C. Bye, Warner Co., District 3; J. A. Dunaway, Peery Lime Co., Inc., District 4; Fred Witmer, Ohio Hydrate and Supply Co., and W. W. Sprague, National Mortar and Supply Co., District 5A; Russell Rarey, The Marblecliffe Quarries Co., District 5B; L. N. Carmouche, The Dow Chemical Co., District 6; W. E. Wing, Marblehead Lime Co., District 7; C. E. Brady, Allwood Lime Co., District 8; Henry LaLiberte, Cutler-Magner Co., District 9; K. L. Hammond, Keystone Lime Works, Inc., Districts 10 and 11; Paul Sunderland, Ash Grove Lime and Portland Cement Co., District 12; G. E. Robinson, Austin White Lime Co., District 13; P. H. McMillan, Roche Harbor Lime and Cement Co., District 14; and Kennedy Ellsworth, United States Lime Products Corp., District 15. Messrs. Brigstocke, Hammond, Wing, Corson, Miner, Bye and J. S. Offutt, United States Gypsum Co., comprise the executive committee.

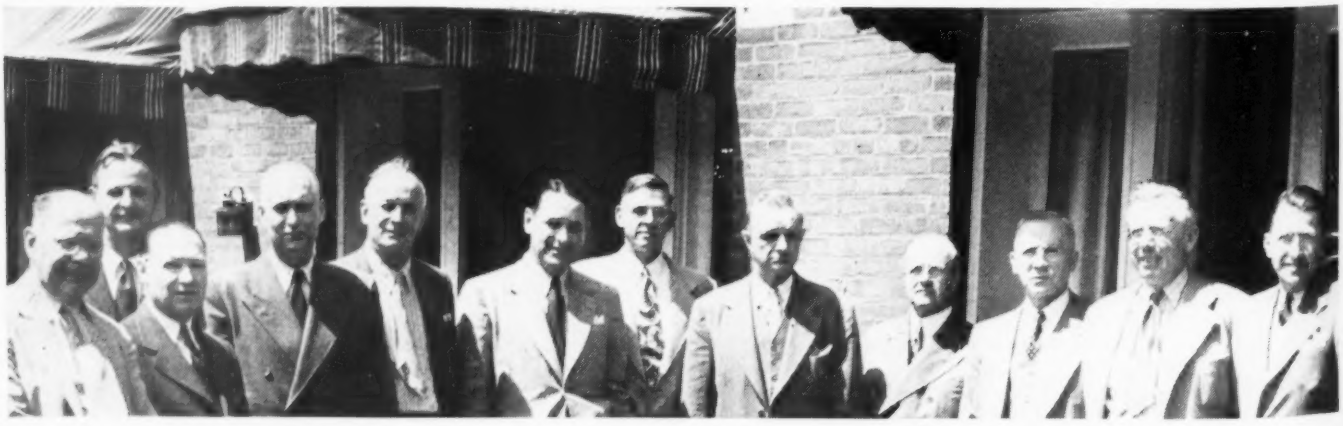
WALTER STAUFFER, for many years president and general manager of the National Lime Association, served as chairman of the opening general session in the absence of chairman K. L. Hammond, absent due to illness. Mr. Stauffer was very brief in his opening remarks, commenting on the unfortunate absences of Mr. Hammond and Mrs. Roma Turpen, who was forced by illness to miss her first convention in years, and urging that there be generous participation in the discussions planned for the meetings. He was generous in his praise of the work accomplished by Robert Boynton in his first year as general manager of the Association.

H. D. Brigstocke, new president, National Lime Association

J. M. DEELY was appointed chairman of the resolutions committee and Stanley Storey read the financial report, James H. McNamara, treasurer for many years, having passed away during the year. The Association is in excellent financial condition and has provided a backlog of funds to finance needed activities.

General Manager's Report

ROBERT BOYNTON, general manager, in a well-received report on recent Association activity, commented briefly on three major achievements. One was the successful effort in securing a dollar per ton needed increase in prices for lime from O.P.A. in 1946. Secondly, approval has been granted by A.S.T.M. to the Association's proposed specifications for Type N and Type L building limes and progress is being made toward securing federal approval as well. Third, Mr. Boynton reported very substantial



Group of members, Board of Directors. Left to right: W. W. Sprague, Bolton L. Corson, Paul Sunderland, Wallace E. Wing, C. C. Loomis, Amos B. Miner, Reed C. Bye, Russell Rarey, Henry LaLiberte, Fred Witmer, Ralph L. Dickey, and J. A. Dunaway

progress in the program of research.

He stressed the long range benefits from research and the importance of carrying on an educational program. Great quantities of Association literature are in demand, and are being supplied to universities and colleges for use in preparing lessons and in classroom study. Some 100 agricultural courses and 65 construction courses have been recipients of literature.

A 125 page book, "Use of Chemical Lime in Industry," is to be printed for the purpose of educating men in the lime-consuming industries to the myriad uses for lime which need exploration. More publicity articles are to be developed and market research is to come in for greater attention. As an example of the need for more market research, Mr. Boynton mentioned that a number of inquiries are being received for information on the use of hydrated lime as a soil stabilizer for road construction. A Texas inquiry pointed out that there is a potential market in that state for stabilization purposes equivalent to 2½ times the lime producing capacity there. A survey is to be conducted to determine how lime reacts when applied to various soils.

Six new members have joined the Association since the last convention. They are The Gager Lime Co., The Dow Chemical Co., United States Lime Products Corp., The Diamond Springs Lime Co., Clifford L. Miller and Ste. Genevieve Lime and Quarry Co. In concluding, Mr. Boynton urged the membership to present their problems to his office.

Resolutions

Resolutions were presented and unanimously approved that expressions of sympathy as recorded in the minutes of the meeting be conveyed to the families and associates of four members who passed away since the last convention. These members were J. Stewart Elwell, Wisconsin Lime and Cement Co., Samuel M. Shallcross; H. G. Bridgewater, founder of Superior Lime and Hydrate Co., Inc., and James McNamara, president, Eagle Rock Lime Co., and treasurer of the Association for many years.

NATHAN C. ROCKWOOD, consulting editor of ROCK PRODUCTS, was elected an honorary life member of the National Lime Association, on May 6, he and past president and general manager, Walter Stauffer, being the only men to hold that distinction. In making the presentation, which was unanimously and enthusiastically approved, Russell Rarey said:

"My talk today is a pleasant one, and I know you will all share with me that pleasure when you learn of the request I make of you.

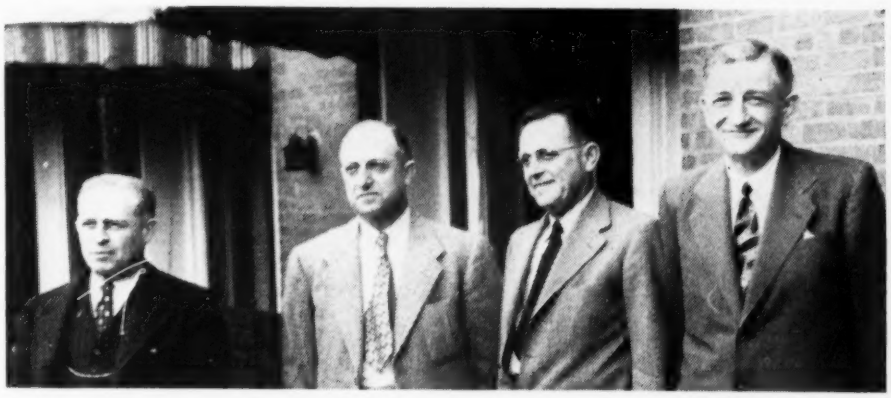
"I am speaking to you at the request of the Board of Directors of the National Lime Association, which at its meeting Sunday, May 4, by its unanimous action instructed me to ask your unanimous approval of its action.

"NATHAN C. ROCKWOOD, 'Rocky' to to most of us, has for many years been a friend of the rock products industries in general and the lime industry in particular.

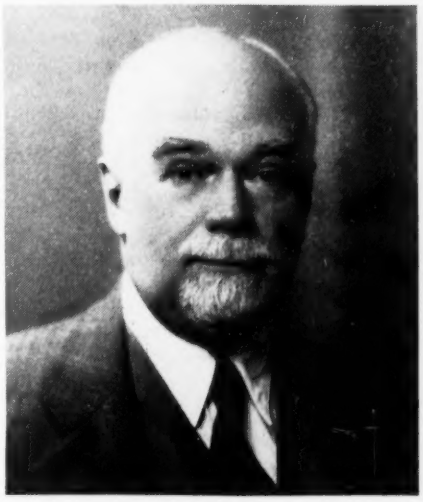
"While editor of ROCK PRODUCTS 'Rocky' had ample opportunity to exercise his interest in and his friendship for the lime industry and the National Lime Association. From his very capable pen during these many years past has flowed words of advice and warning, words of praise and commendation and—at times—words of constructive criticism.

"Not only has 'Rocky' written wisely and sympathetically of our industry problems but he has on numerous occasions contributed greatly by his presence and his personal counsel at our conventions and association gatherings.

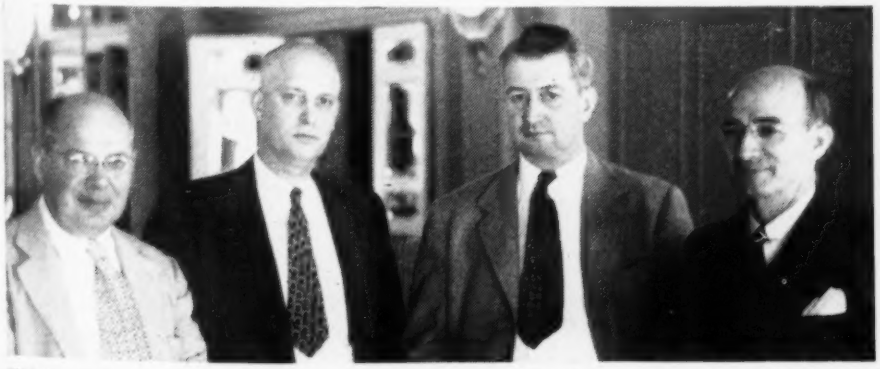
"'Rocky' has a personality all his own—quiet and retiring. He has endeared himself to all members of this association. Now, after many years, 'Rocky' has withdrawn from the first line of tradepress responsibility. He continues to maintain first-hand knowledge of and an interest in our



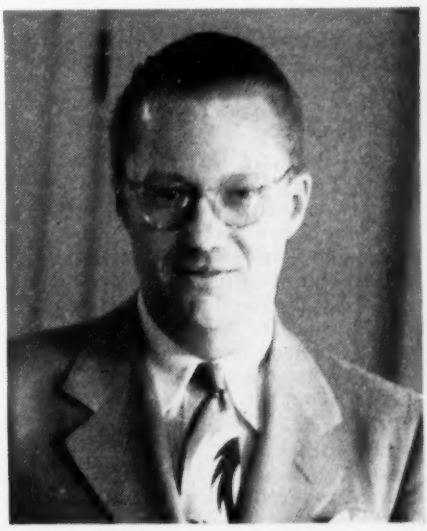
Group from St. Regis Paper Co., participants in packaging session. Left to right: Messrs. Burton A. Ford, C. H. Hartman, Leopold, and H. S. Hangan



Nathan C. Rockwood



W. W. Sprague, Wallace E. Wing, Robert A. Temple of Marblehead Lime Co., and Arthur C. Hewitt, Warner Co.



Robert S. Boynton, general manager, National Lime Association

A group from National Gypsum Co. Left to right: John C. Best, Amos B. Miner, Mrs. Best, Fred A. Manske, and Keith W. Waugh

industry, he continues an authority on current problems and he continues to write editorials and messages of interest and inspiration.

"But today 'Rocky' is not here among us. Doubtless he will come again, but our Board of Directors has deemed it appropriate and the time as fitting to ask that 'Rocky's' service to our industry be acknowledged and that our debt to him be confessed.

"It becomes, therefore, my pleasant duty, Mr. Chairman, to move that NATHAN C. ROCKWOOD be hereby elected to honorary life membership in the National Lime Association and that his election thereto be made known to him with our compliments by a suitable notice or letter drawn and signed by the president and secretary of our Association."

Safety Competition

PAUL SUNDERLAND announced the winners of the 1946 National Lime Association safety competition based on Bureau of Mines figures. The Asbury plant of Standard Lime and Stone Co., Knoxville, Tenn., operating 134,674 man-hours without a lost-time accident in 1946, was the only eligible plant with a perfect record that year. The Thornton, Illinois, plant of Marblehead Lime Co., ineligible in the 1946 competition because it had no associated quarry, cooperated in the monthly service and also had a perfect year. Such operations will be eligible in the 1947 competition.

Railroad Car Situation

"The Railroad Car Situation as It Exists Today" was discussed by C. R. MEGEE, vice-chairman, Car Service Division, Association of American Railroads. The present car shortage, which is more serious than during the war, had its beginning in 1930, according to Mr. Megee. The average number of new cars placed in service annually in the 1920's was 100,000 and in the 1931-1938 period dropped to less than 25,000 a year. Cars could not be built during the war, with the result there has been a large shrinkage in ownership. Carloading is now the heaviest since 1930 and with one-half million fewer cars available.

The outlook is not good for the immediate months ahead, with a heavy backlog of grain shipments to be moved, anticipated bumper crops expected and heavier than ordinary movement of coal and iron ore. Some 97,000 cars are on order but deliveries during April did not keep pace with retirements of cars. By August, new cars are expected at the rate of 10,000 per month so, by the end of 1947, ownership of cars will be increasing to more than offset retirements. Mr. Megee urged that all users of cars cooperate during the critical days ahead. It was pointed out to Mr. Megee that covered hoppers have a wide application in the movement of chemical lime and, therefore, that the railroads should consider building more cars of that type. He said that 18,000 were on order.

Lime for Industrial Wastes

The important role of lime in the treatment of industrial wastes was outlined in a paper on the subject of stream pollution by EDMUND B. BESSELIEVRE of the Dorr Co. In opening, Mr. Besselievre said that more and more Bills were in process of legislation, concerned with stream pollution from liquid wastes, because of their effects on health and the damage that results from the discharge of wastes into streams. The problem is to treat the wastes economically and in such a way as not to stifle industry.

Lime is the most important chemical for the treatment of wastes, he said, because it is cheap, easy to handle and is an effective neutralizer of acid materials, where it is necessary to attain the optimum pH for economical coagulation and precipitation.

Mr. Besselievre itemized a list of industries with wastes in need of treatment and the lime requirements for effective and economical sedimentation, in order to emphasize the wide application of lime. Among them were vegetable canneries, creamery wastes, pickling plants, corn products refineries, roofing paper plants, meat packing plants, chrome plating and distillery wastes.

He stressed the need for proper application of the lime in order to attain uniform results and to eliminate wasteful practices. If industry be shown the value of lime and its economics, he said, more plants for its application to wastes will be added.

German Water Conditioning Practices

An illustrated description of water conditioning practices in Germany, with emphasis on the utilization of lime, was presented by W. W. CERNA, Hall Laboratories, Inc., Pittsburgh, Penn., who was a member of a technical and scientific mission sent to study German industry by the Foreign Economic Administration. Water conditioning methods, hardness removal, for power plants were emphasized in his talk. One of the most interesting processes described utilized a rotary flow conical shaped shell, granular, precipitated calcium carbonate and milk of lime introduced tangentially from below. The reaction products crystallize on the grains and the growing grains are removed from below, reburned and reused as lime.

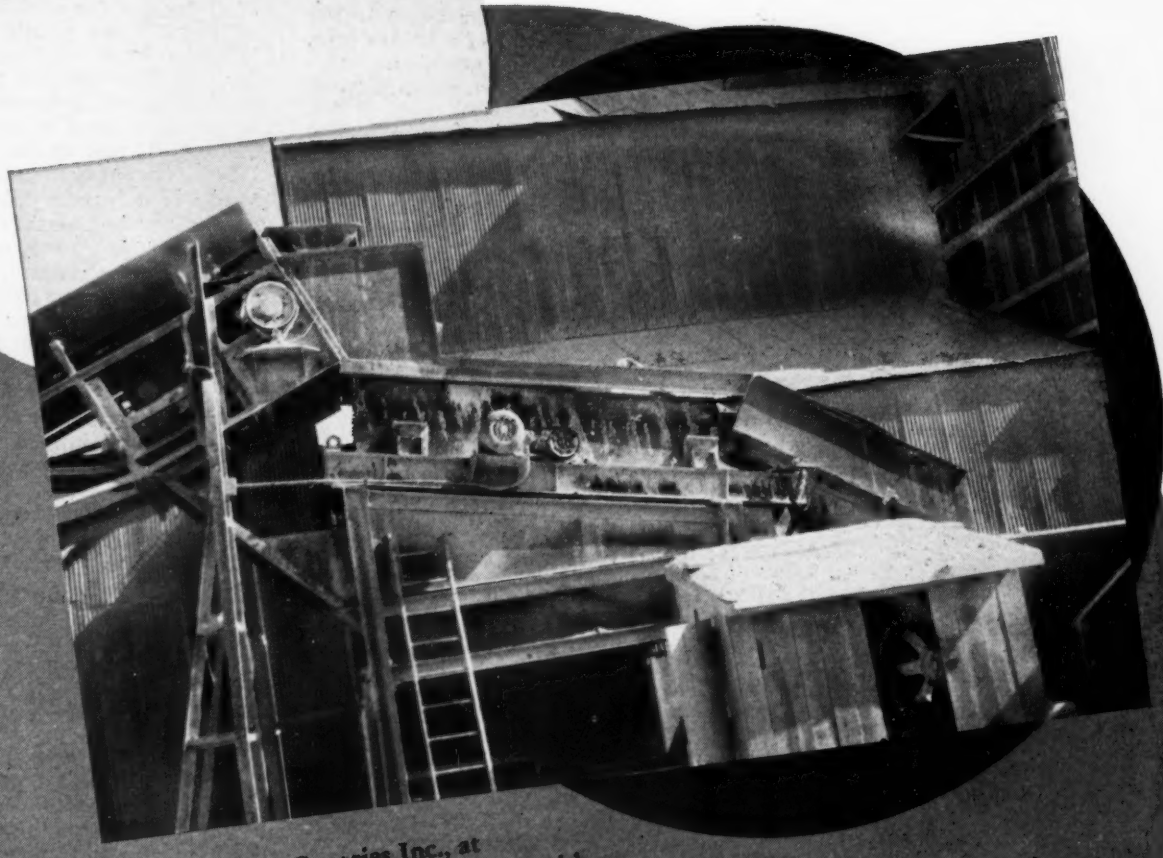
Manufacture of Chemical Lime

VICTOR J. AZBE'S paper, "The Manufacture of Chemical Lime," was briefly touched upon by the author and therefore not given full justice. The paper will be published in full

(Continued on page 128)

James A. Murray, Warner Co., left, and J. V. Andrews, The Kelley Island Lime and Transport Co.

SIMPLICITY SCREEN SET-UP YIELDS 500 TONS RIPRAP PER DAY



When Bussen Quarries Inc., at Jefferson Barracks, Mo., were met with heavy demands for riprap in river flood control projects, they had to overcome the high labor costs and low-tonnage yield of old-fashioned hand methods. So they did it the easy way . . . with Simplicity Gyrating Screens. They set up an auxiliary "one-man" riprap operation that mechanically produces up to 500 tons of riprap per day. Material from the crusher is conveyed over a 4' x 12' heavy-duty, double-deck Simplicity Screen, with 6" and 2" openings. A 25-ton surge bin receives the oversize—or riprap—and delivers it by conveyor to a steel chute for truck loading. Wear, parts replacement, and other maintenance costs are negligible. Two additional Simplicity Screening Units—double and triple deck models—efficiently screen the product passed on from the riprap operation. Simplicity Gyrating Screens are available with 1, 2, 3, and 4 screens in sizes from 2' x 3' to 5' x 14'. Send us your screening requirements and we will recommend the model specifically suited to speed and simplify production for you.

Simplicity
TRADE MARK REGISTERED

ENGINEERING COMPANY • DURAND, MICHIGAN

Consider Manufacturing Problems At Operating Session

REFRACTORIES, instrumentation and automatic control of kilns, packaging, dust control, elevators and conveyors were the principal topics discussed at the third meeting of the Operating Division, National Lime Association, May 7 and 8. This meeting was patterned after the preceding ones, to bring out maximum discussion from the floor.

H. M. BEATTY, vice-president, The Kelly Island Lime and Transport Co., chairman of the program committee was presiding officer for the first session, which opened with his report on the questionnaire which had been designed to determine if certain trends were developing in industry operating practices. In the summary, shown herewith, the number of companies reporting (left hand column) is not the number that returned questionnaires, some of the companies using one or more of the itemized practices.

Returns from the questionnaire were as follows:

Total					
39	Source of stone	Quarry 25	Mine 10	Purchase 4	
40	Stripping	Shovel 19	Scraper 11	Other 9	Crane 1
42	Drilling	Blast Hole 15	Wagon 19	Other 9	
41	Primary Blasting	Standard 24	Delay 16	Primacord 1	
33	Secondary Breakage	Drop Ball 7	Pop Shooting 26		
39	Loading	Shovel 26	Loader 6	Hand 7	
42	Transportation	Rail 10	Truck 23	Conveyor 8	Dumpster 1
57	Crusher	Gyratory 19	Roll 9	Cone 5 Hammermill 11 Jaw 13	
49	Screens	Revolving 12	Vibrator 26	Shaker 7	Hum-mer 4
39	Calciner	Shaft 19	Rotary 11	Mod Shaft 7	
30	Hydrate	Yes 28	No 2		Other 2
71	Bag	Lime 23	Hydrate 27	Stone 21	
47	Bulk Shipment	Rail 28	Truck 19		

Refractories

Advantages and disadvantages of the various types of refractories, their special purposes and their limitations under differing service conditions were discussed by W. F. ROCHOW, Harbison-Walker Co. He also commented on the differences in chemical composition of refractories ranging from high silica, acid brick to the strongly basic products.

Abrasion in the cold zones of kilns, rapid heating and cooling, spalling influences which increase with heat, the chemical reactions in the hottest zones which increase considerably with small increments of temperature, slagging, vitrification, shrinkage and clinker adhesion were among the factors he discussed as having a bearing on the type of refractories to be selected. To counteract differential expansion, he recommended that refractories be laid as tight as possible. Mr. Rochow used slides to show the difference in porosity, shrinkage and spalling between Super-duty brick and the conventional high-heat duty brick. He suggested that magnesitic brick may prove economical for shaft kilns.

In his comments on insulation, he showed an insulated section of a rotary kiln to illustrate the conventional practice of employing key block longitudinally at the quarter points. Insulation is carried as far as 80 to 100 ft. from the hot end of a rotary kiln, he said, in reply to a question.

Refractory brick are manufactured either by high pressure using a dry mix and a die, by extrusion of a stiff consistency mix through a die or by hand. One lime producer remarked that, in his experience, hand-made brick stood up better insofar as spalling was concerned where rotary kilns were frequently stopped for ring removal. Another producer remarked that he uses silica brick as standard practice for dolomitic lime but found that that type was impractical with high calcium stone.

Instrumentation

A paper, "Instrumentation and Automatic Control of Rotary Kilns," by JOHN R. GREEN, Brown Instrument Co., was particularly valuable because he took a futuristic approach, pointing out not what has been done in the lime industry but what could be done in the way of instrumentation, pointing to practices of the portland cement and other industries. He also considered shaft kiln operation.

The lime industry has not been instrument-minded, he said, in starting, probably because narrow profit margins are involved, many workers are unskilled and the burning process has probably not been considered as requiring the precision desired for other commodities. Fuel being a main item of cost, however, he said that savings in that respect of ten per cent could be expected through proper use of the correct instruments and controls.

He cited the use of radiation pyrometers in the cement industry for recording purposes as well as control and said that the apparatus would be practical in rotary kiln lime plants if the correct sighting point could be determined; otherwise thermocouples could serve the purpose. Also, they could be used to determine the temperature distribution throughout the kiln, as employed by the cement industry to check on refractories.

He also discussed methods for measuring fuel rates, measurement and control of volume and temperature of primary air and secondary air, kiln draft at the firing hood and accurate means for holding predetermined draft, etc., and said that progress is being made toward the development of apparatus for continuous sampling of gases. Lime plants in the paper industry have continuous recorders for CO_2. The trend in rotary kiln operation, he said, is toward the adoption of constant speed of rotation, leaving the rate of fuel as the variable.

As a minimum requirement, he said that a rotary lime kiln should have devices for automatic control of kiln draft, recording flow meters for gas or oil burner pressures, kiln temperature and speed recording.

The same factors as in the rotary kiln require control in the shaft kiln, he said. Blast furnaces, he pointed out, use thermocouples for product temperature measurement; record the temperature of primary air and, if recirculation principles are employed, measure those temperatures at various points; utilize portable gas analyzers; have automatic control of gas temperatures where gas producers are used; measure the temperature and record the draft. The minimum instrumentation for a shaft kiln, would record the temperature in the cooling zone, measure draft and the rate of fuel flow.

Packaging

An entire session was devoted to packaging, under the chairmanship of BOLTON L. CORSON, G. & W. H. Corson, Inc. H. S. Hangan, manager of the field engineering department, St. Regis Paper Co., in a paper "Packaging Problems in the Lime Industry," gave results of a survey made in 12 Ohio plants, as to size of packing machine tubes, manpower required, capacities and bin arrangement. Filling tube sizes were 1¼, 1⅜ and 1½ in. diameters and speeds ranged from 860 to 1160 r.p.m.

Bins and bin design came in for considerable discussion by Mr. Hangan and later from the floor, bridging and arching and rat-holing being factors that affect supply to packing machines and result in variation in weights. As Mr. Hangan pointed out, a constant head of feed is essential, and the use of circulating systems of feed from main bins to surge bins has resulted in marked improvement and uniformity in packing. He pointed to practices in the cement industry where feeders are employed between large bins and feed tanks and bin level indicators control the level between limits.

Slides were shown to illustrate proposed methods of feeding to packing machines, one showing a vertical

(Continued on page 114)

Gulf Quality Lubricants and Fuels help contractors keep big dock job *on schedule*

Walsh and Bates & Rogers have combined equipment and personnel to construct new coal docks at Toledo, Ohio, for the Baltimore & Ohio and New York Central Railroads. This $13,000,000 job involves moving 2,000,000 cu. yds. of earth, driving 15,000 wood pilings, 12,000 tons of sheet piling, pouring 25,000 yds. of concrete, and laying 60 miles of railroad track.

"GULF QUALITY LUBRICANTS AND FUELS have played a big part in our fast progress on this tough job," says S. C. Richards, General Superintendent. "In spite of punishing operating conditions, our equipment has delivered top-notch performance day in and day out—and we haven't had a serious mechanical delay."

Like many other leading contractors, Walsh and Bates & Rogers have found that Gulf quality lubricants provide a higher degree of protection when equipment is pushed to the limit—and that Gulf fuels contribute to maximum power and efficiency. Result: fewer delays, better all-round equipment performance, and a speedier, more profitable job!

Write, wire, or phone your nearest Gulf office and arrange to use Gulf quality lubricants and fuels on your next job. They are quickly available to you through 1200 warehouses located in 30 states from Maine to New Mexico.

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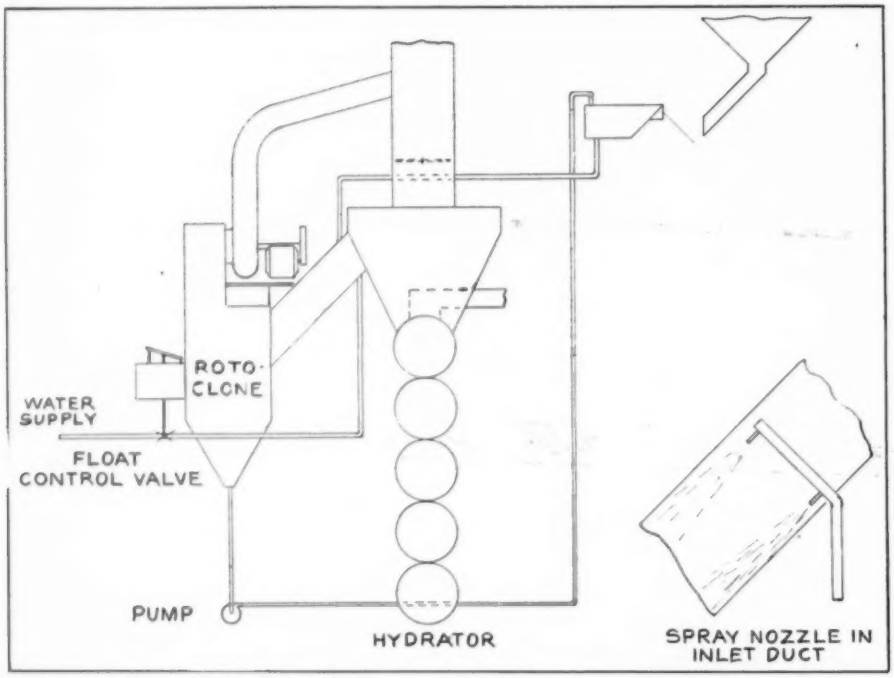
Division Sales Offices: Boston · New York · Philadelphia · Pittsburgh · Atlanta · New Orleans · Houston · Louisville · Toledo



Hydrator dust collector installation of Marblehead Lime Co., showing return from collector into the plant system

screw lift from the large storage bin to the packing machine bin, another a Redler conveyor arrangement, and a third an inclined screw conveyor. Circular bins give best results, in Mr. Hangan's opinion, and baffles and aeration are means to counteract ratholing. The disadvantage to circulating systems, now employed by 50 per cent of the cement industry, is the power required. The proper size of bag for each product was emphasized, as important for good results and accuracy. One of the problems discussed in connection with packing hydrate is getting rid of the air.

C. C. LOOMIS, president, New England Lime Co., Adams, Mass., presided over a session in which dust control and the use of elevators and conveyors were considered.

Dust Collection

WALLACE E. WING, president, Marblehead Lime Co., Chicago, told of studies made by his company on the particle size distribution of collectible dust, and showed slides of the sampling tube developed to gather samples from the plant exhaust stack. Robert Temple, vice-president in charge of operations of Marblehead Lime Co., followed with a short description of the arrangement of a Roto-clone dust collector used to collect dust from the hydrator stack (see drawings herewith), the dust being returned into the system as a sludge.

Sound as a means of recovering dust particles was pointed to as a definite possibility by WILLIAM A. VAN ALLEN, vice-president, Ultrasonic Corp., Cambridge, Mass., who described sound wave-emitting apparatus that has been developed to agglomerate fine particles which then fall into the size range collectible by cyclone. Agglomeration is, of course, a result of particle collision and sticking.

The first commercial application has been a pilot plant with sonic device applied to carbon black emitted from a stack in Boston. The fine particles have been agglomerated and 80 per cent of the dust collected. A slide was shown of the sound wave generator, essentially a high speed gas siren driven by a gas turbine, which forces out compressed air. The installation in Boston consists of routing the gases into a sonic tank, from below up to the source of sound, primary, and secondary cyclone collectors. For a 5500 c.f.m. installation, the contact time would be ten seconds, there would be a 3-in. water pressure drop across the system and, according to Mr. Van Allen, a 90 per cent collection efficiency would be attainable. Efficiencies up to 99 per cent would be possible by the use of sonic principles at higher cost.

Elevators and Conveyors

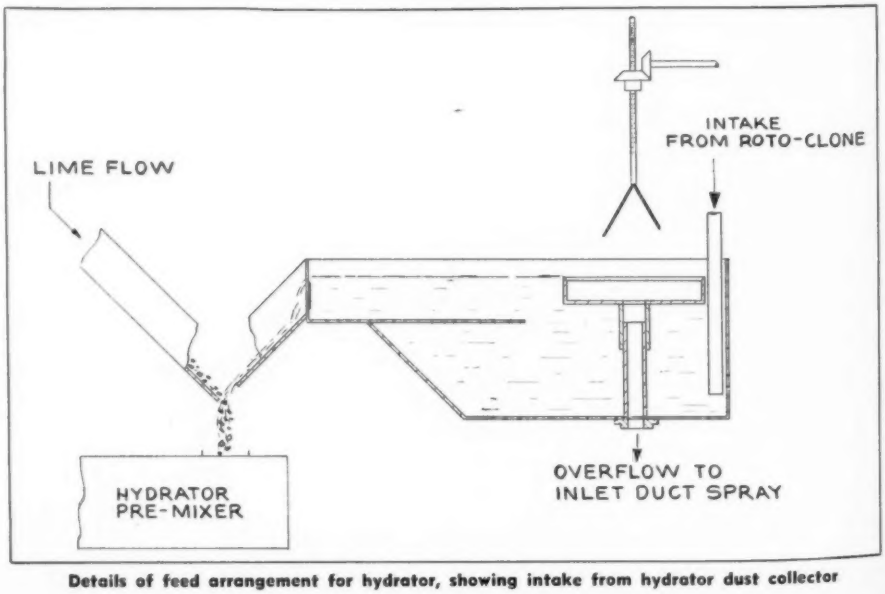
ARTHUR C. HEWITT, chief engineer of the Bellefonte Division, Warner Co., led the discussion on elevators and conveyors, summarizing operating difficulties encountered and corrective measures employed. Particular reference was made to bucket elevators. Elevator casings are liberally designed at Bellefonte to provide for gear-head motors and traction wheels are used, top and bottom, with ordinary malleable iron chain. No advantage was found in heat-treated metals, after a six months' comparative study in service, to justify their adoption in preference to malleable iron.

In commenting on belt conveyors, stress was placed on the need for accurate cutting, in the splicing of belting, in order for the belts to run true. If the belt continually runs to one side on its idlers, a slight cocking of a few troughing idlers was mentioned as a means to guide the belt.

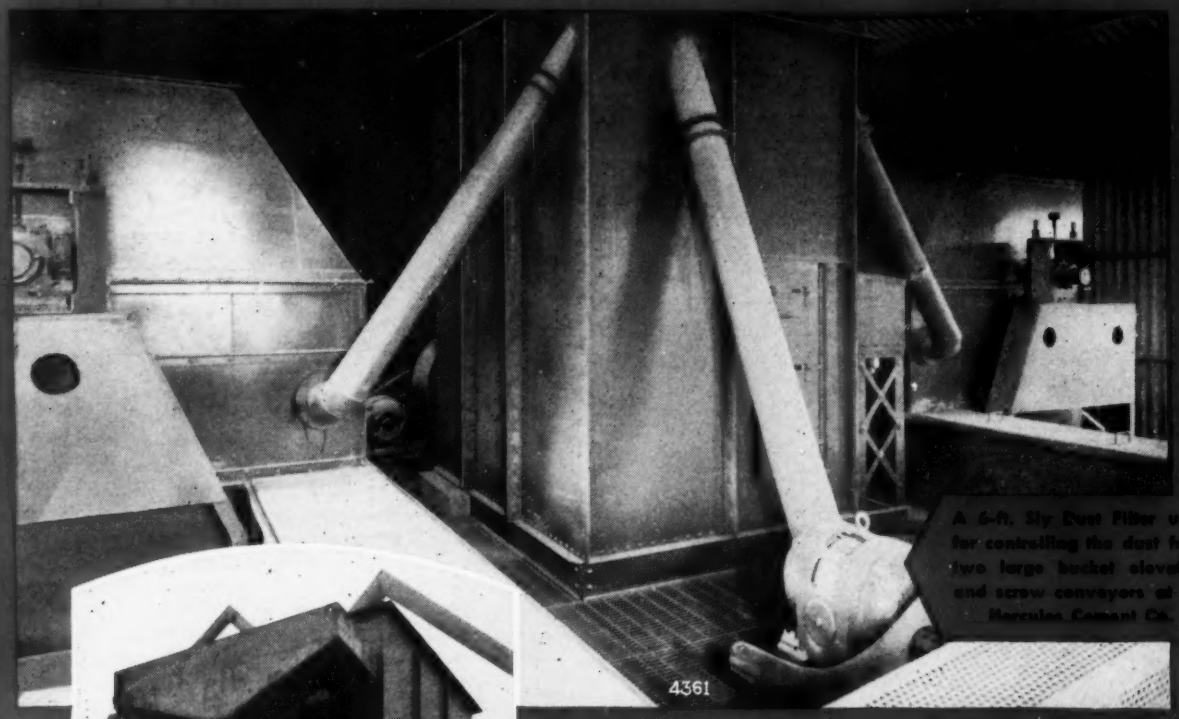
V. P. AHEARN, executive secretary, National Sand and Gravel Association, was the guest speaker on the subject, "Labor Laws, Agreements, and Management Privileges," at the concluding session under the chairmanship of F. A. MANSKE, production manager, National Gypsum Co.

He started by considering possible labor legislation that will be enacted, expressing dislike for government power implications in some of the proposals, and emphasizing the need for reassertion of power by the States. Mr. Ahearn does like the idea that there will be no federal mediation board and is set against labor courts.

(Continued on page 132)

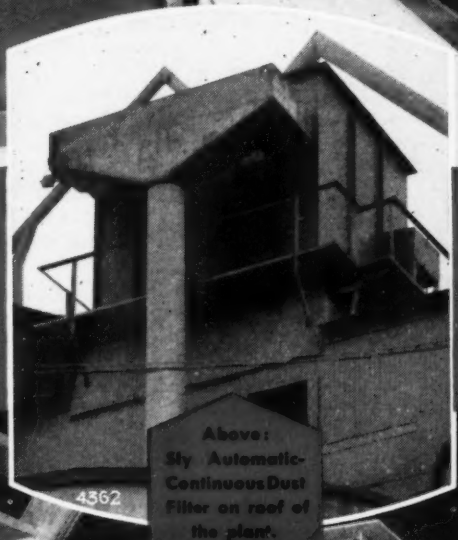


Details of feed arrangement for hydrator, showing intake from hydrator dust collector



A 6-ft. Sly Dust Filter used for controlling the dust from two large bucket elevators and screw conveyors at the Hercules Cement Co.

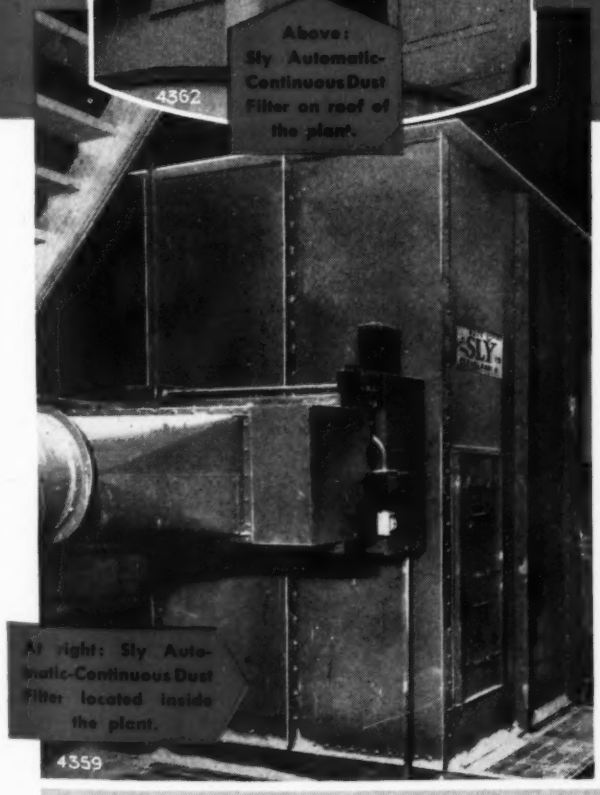
4361



Above: Sly Automatic-Continuous Dust Filter on roof of the plant.

4362

Important Savings with SLY DUST Control



At right: Sly Automatic-Continuous Dust Filter located inside the plant.

4359

● This large modern plant of the Hercules Cement Co. uses both automatic and automatic-continuous Sly Dust Filters.

Only Cloth-Screen Type Filters will collect the really *fine* dust. Compared with other cloth-screen filters, Sly provides greater filtering capacity, power savings, easier bag replacement, automatic control, and effect important economies in operation and maintenance.

May we discuss *your* dust problem with you?

THE W. W. SLY MANUFACTURING CO.

4746 TRAIN AVENUE • CLEVELAND 2, OHIO

SLY

INDUSTRIAL DUST CONTROL

Industrial Sand

(Continued from page 105)

51	A.F.A. Fineness No. 47 Chemical Analysis, Per cent (ignited basis)	
97.95	SiO_2	97.77
0.088	Fe_2O_3	0.381
0.24	Al_2O_3	0.05
1.62	TiO_2	1.61
0.10	CaO & MgO	0.10
0	Others	0.089

The glass-sand product, 71.3 per cent of the total sand, contained slightly too much iron for plate glass, but met other specifications for purity. It should, however, be suitable for window glass and other glass products requiring less purity.

Attrition Scrubbing

Attrition scrubbing is a means of removing staining impurities from sand grains and therefore should not improve unstained material. Numerous tests with other sands have shown, however, that appreciable beneficiation is sometimes obtained by the crushing and subsequent washing away of softer impurities. Many favorable tests of attrition scrubbing have been made by others, using mills with moving parts to scrub the sand grains by forceful abrasion against each other and against the parts of the machine. Costs of electrical energy are comparatively high when using this type of equipment.

Small-scale testing has demonstrated that substantial attrition scrubbing is also obtained by simply tumbling or rolling the dry sand or scrubbing the grains wet by rolling or tumbling with water and small steel slugs. The sand used was sized to plus 100-mesh before treatment. In each treatment, the sand product was washed free from fine or dislodged impurities and subsequently dried. The tests were made with a porcelain pebble-mill jar. Wet attrition scrubbing with slugs reduced the iron oxide content of the sand slightly, but not enough to justify the treatment.

Chemical Treatment

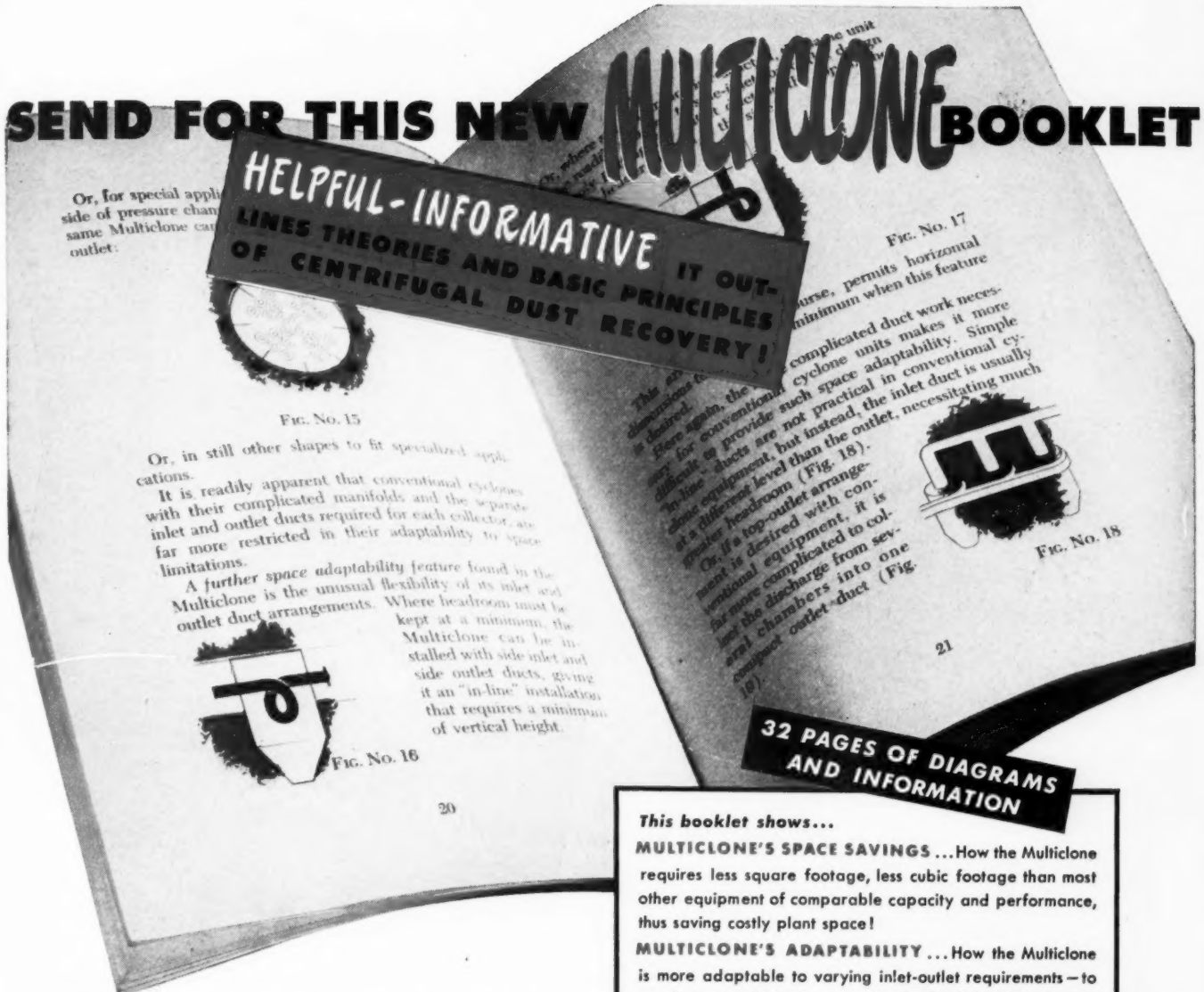
Trial with various methods of chemical treatment indicated that digestion with sulfuric acid alone would remove most impurities that are capable of being removed by any form of chemical treatment. The impurities affected are usually present as staining on the sand grains or as tiny, discrete grains.

Tests of the chemical treatment of San Jacinto sand were made using sulfuric acid of several concentrations, and digesting at 85 deg. to 90 deg. C. for four hours. The acid-treated sand was subsequently washed with water and dried. Chemical treatment was no more successful than attrition scrubbing in reducing the iron-oxide content to tolerable values for flint or plate glass.

Dasher and Ralston have described various new methods of cleaning glass

(Continued on page 122)

SEND FOR THIS NEW MULTICLONE BOOKLET



32 PAGES OF DIAGRAMS AND INFORMATION

NO MATTER whether you are now using mechanical dust recovery equipment or are planning the installation of such equipment at some future date, here is a booklet just published that is full of helpful and valuable information on centrifugal dust recovery. It not only explains the basic methods and principles involved, but also shows the important differences between small and large diameter separating tubes, shows how to simplify your duct work and reduce installation costs, and outlines many other important factors to be considered in selecting mechanical dust recovery equipment.

In addition, this informative booklet illustrates and explains how MULTICLONE'S unique *vane* design is fundamentally different... how it makes possible greater compactness, simpler installation, high recovery of the small particles as well as the medium and coarser ones, and many other facts on MULTICLONE advanced design.

A limited supply of these booklets is available for free distribution to those interested in mechanical recovery equipment and methods. Write for your copy today.

This booklet shows...

MULTICLONE'S SPACE SAVINGS ... How the Multiclone requires less square footage, less cubic footage than most other equipment of comparable capacity and performance, thus saving costly plant space!

MULTICLONE'S ADAPTABILITY ... How the Multiclone is more adaptable to varying inlet-outlet requirements—to varying space limitations—and is simpler to insulate, thus reducing installation costs!

MULTICLONE'S EFFICIENCY ... How Multiclone's multiple *small diameter* tubes, made possible by its exclusive *vane* design, give higher centrifugal forces and more complete cleansing of *all* suspended particles—even small ones of 10 microns and less!

MULTICLONE'S LOW MAINTENANCE ... How the Multiclone has no high speed moving parts to repair or replace, no pads or filters to clean or renew, nothing to choke gas flow or increase draft losses as suspended materials are recovered. Multiclone draft losses remain uniformly low—recovery efficiencies uniformly high—at all times!

Make sure that a copy of this new booklet is in your reference files by sending for your copy now!

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COTTRELL Precipitators
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TURBULAIRE Spray Dryers

...in all parts of the U.S.A. and foreign countries.

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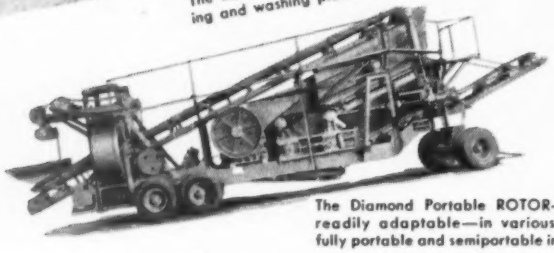
DIAMOND DYNAMICS

The new Diamond-equipped, gravel crushing, screening and washing plant of King Brothers, Dayton, Ohio.

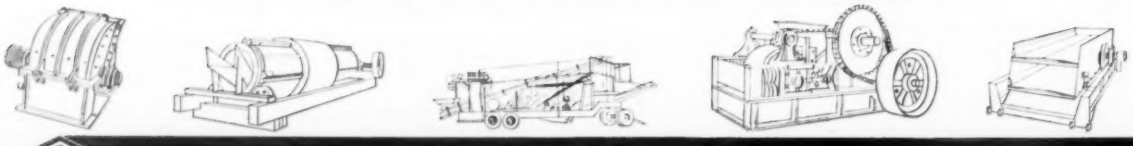
in action



The Diamond Portable ROTOR-LIFT Plant, readily adaptable—in various sizes—to fully portable and semiportable installations.

• • • Producing crushed gravel economically at or near the site of a job is one of the tough problems construction engineers have to lick. That's where the *portability* of the Diamond Rotor-Lift gravel crushing and screening plant can save time and cut haulage costs. Here in a completely *portable* plant, is all equipment needed to process gravel from its raw state to the exact size needed for the job . . . and as close to the job site as possible! Learn how Diamond Dynamics can work for you. Call your Diamond dealer today!

"THERE'S NOTHING TOUGHER THAN A DIAMOND"



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The DIAMOND line of Rock and Gravel Crushing and Handling Equipment:

- Portable Crushing and Screening Plants
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- Vibrating Screens
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- Drag Washers
- Feeders
- Bins-Hoppers

FOR BIGGER PAYLOADS — — AMSCO PLUG-WELDED DIPPERS

Amsco Plug-Welded Dipper Doing Tough Rock Digging Job at Lassiter Quarry of Bryan, Monroe Co., Raleigh, N. C.

LIGHTER WEIGHT
. . . bigger load with every bite

Plug-welding design makes possible a lighter weight dipper. Plugs in one casting fit in sockets in overlapping casting forming groove for weld deposit—gives strength with minimum use of welding material . . . permits interlocking design that reduces total weight . . . eliminates need for heavily reinforced sections.

Use all available shovel power to move a bigger load with every bite.

FASTER DIGGING
. . . greater yardage in every shift

Plug-welding eliminates jutting weld shoulders that resist penetration, loading, and dumping . . . contoured lip and easily-replaced teeth give clean bite for faster digging. Surface of manganese steel work-hardens under impact—takes on a "plowshare" polish that combats abrasion . . . offers minimum frictional resistance in loading and dumping. Flared body tapers out to door for faster unloading—material can't bridge.

GREATER STRENGTH
. . . no lost time for breakdowns

Plug-welding provides maximum strength as well as minimum weight.

Austenitic Manganese Steel is used throughout—further assurance of maximum durability and service life. Impact work-hardens the surface of "The Toughest Steel Known" to as high as 550 Brinell while body metal retains its basic toughness.

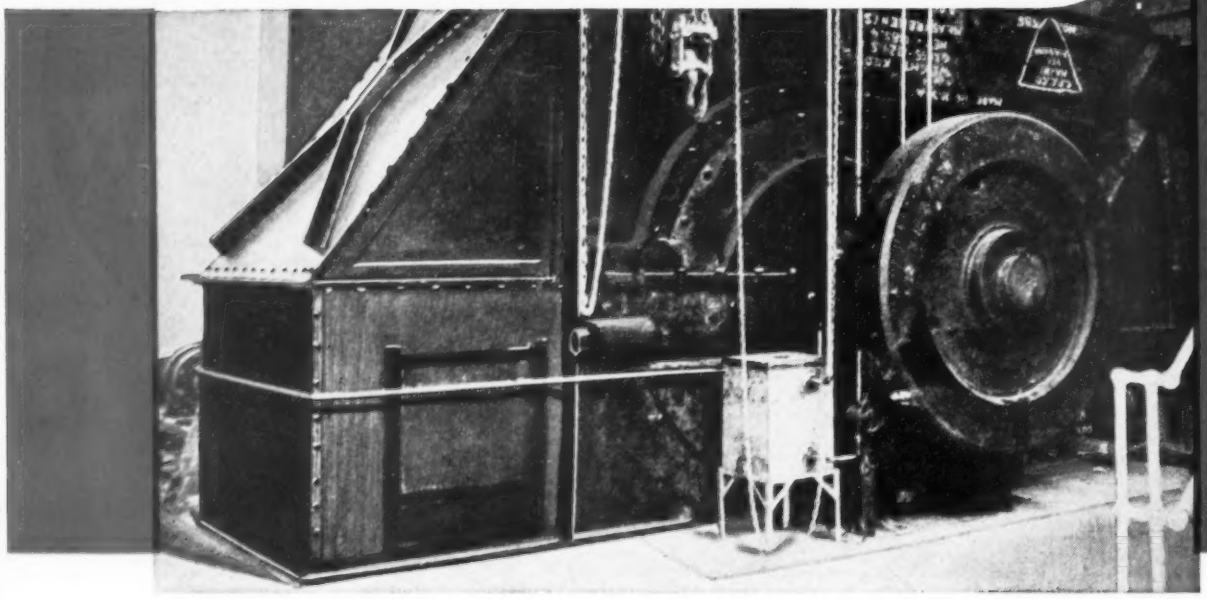
CAPACITIES ½ YARDS AND UP ——————— ***SEND FOR INFORMATION***

AMERICAN **Brake Shoe** COMPANY

AMERICAN MANGANESE STEEL DIVISION
CHICAGO HEIGHTS, ILL.

Foundries at Chicago Heights, Ill., New Castle, Del., Denver, Colo., Oakland, Calif., Los Angeles, Calif., St. Louis, Mo.
Offices in principal cities. In Canada: Joliette Steel Limited, Joliette, Que.

How the CUBAN PORTLAND CEMENT CO. broke a bottleneck... stepped up CRUSHER PRODUCTION



● Dixie Non-Clog Hammermill in operation in plant of the Cuban Portland Cement Co. Incorporating distinct time, labor and money-saving principles, The Dixie Method carries the material right to the hammer points... eliminating need for extra men at feed hopper.

Down in the bay of Mariel, some 20 miles out of Havana City, the semi-tropical climate accounts for 50 to 70 inches of rainfall per year. For the Cuban Portland Cement Co., this factor . . . combined with the soft, wet material generally encountered in quarrying operations . . . was seriously curtailing production.

It was not until the installation of a Dixie Non-Clog Hammermill, equipped with the patented Movable Breaker Plate, that delays due to "Choke-Ups" were reduced and a new 'high' in continuous production was established. Since then, this Dixie Hammermill has worked under the worst possible conditions . . . operating at times for a whole week on raw material which was "nothing but a mass of plastic, sticky, water-sodden mud."

This is only one of numerous instances where a Dixie Hammermill has been instrumental in keeping production at a *high* peak . . . yet at *low* cost.

Let an experienced Dixie engineer show you how the Dixie Hammermill can increase production and profits in *your* crushing operation.

DIXIE

MACHINERY MANUFACTURING CO.

4202 Goodfellow Avenue
St. Louis 20, Mo.

Foreign Sales Office:
104 Pearl St., New York, N. Y.

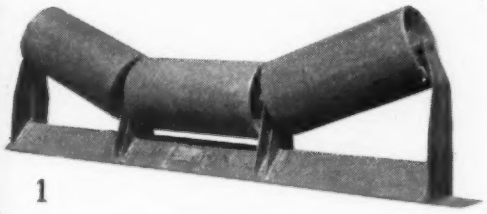
Send for new, illustrated bulletin . . . "More Efficient Crushing of Raw Materials"

YOUR OPERATING COSTS WILL REACH AN ALL TIME LOW

CONVEY THE KREMSER WAY

WITH KREMSER CONVEYOR EQUIPMENT

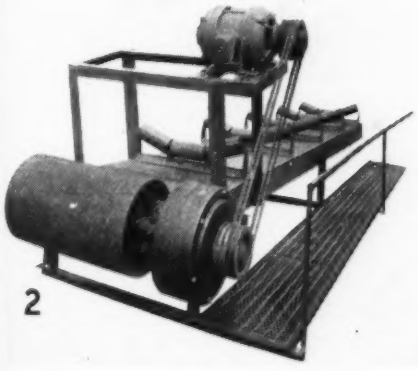
WHEN YOU ARE READY TO PURCHASE A BELT CONVEYOR, CONSIDER OURS. IT IS BUILT AS STURDY AS POSSIBLE, YET SIMPLE IN CONSTRUCTION.



1

IT'S MADE TO STAND THE HARD USAGE IN A QUARRY, PIT OR MINE. VERY ECONOMICAL TO OPERATE — PRACTICALLY NO MAINTENANCE. INCORPORATES ALL THE LATEST IMPROVEMENTS.

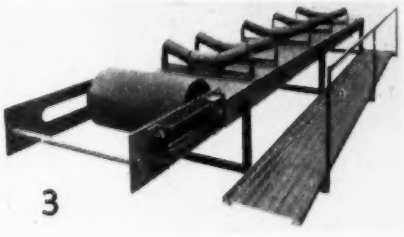
1 New, improved all steel welded, neoprene sealed, pre-greased ball bearing conveyor Idler. No greasing required for the life of the bearing. No maintenance — saves price of an idler within three years' time: average annual lubrication cost is $6.50 per idler. Belt cost reduced, due to elimination of over-greasing.



2

2 Featuring enclosed speed reducer, as shown in picture; also non-skid catwalk — approved by most State Compensation Boards. Snow, ice, dust, etc. which collects on solid floor, cannot cause slippage on this type of catwalk. Head arrangement exactly as shown on picture opposite.

4 All our conveyors of 100′ or longer have our standard automatic take-up, which is as simple and strong as possible, and is practically infallible.



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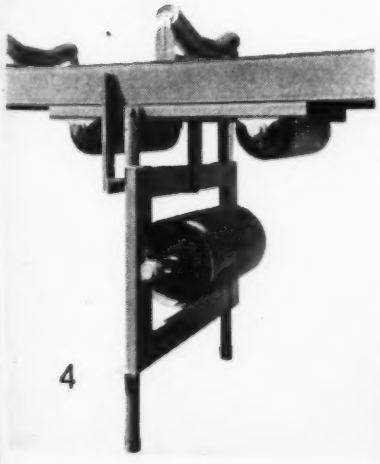

4

3 On our conveyors less than 100′, a mechanical take-up is used, which is very strong, very simple and easy to repair, all parts easy to replace. Our conveyors are built simply yet strong, with practically all maintenance eliminated; thus giving long uninterrupted service.

FRANK A. KREMSER & SONS, INC.
3435 N. Fifth Street · Philadelphia 40, Pa.
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Industrial Sand

(Continued from page 116)

sands, including froth flotation as well as the methods already described. The San Jacinto sand was not beneficiated by flotation, probably because of the absence of free impurities, feldspar, or heavily stained sand grains which are usually affected by this treatment.

It appeared from the results of the various tests that impurities as represented by iron oxide content of less than about 0.07 to 0.08 per cent were present as inclusions in the sand grains.

Inasmuch as the major part of the iron oxide in the sand was in the grains of chert, the washed sand was screened into its several sieve fractions, which were analyzed to determine if beneficiation might be accomplished by selective size grading. The analyses of these fractional parts of the total sand are shown in the table.

Chemical Composition of Sieve Fractions of San Jacinto Sand

	Retained on U. S. Sieve No.					
	30	40	50	70	100	—100
Per cent of total sand	7.4	9.7	12.9	29.7	25.7	14.6
Analysis (ignited basis), Per cent: SiO_2	98.10	98.20	97.26	97.22	97.62	96.69
Fe_2O_3	0.120	0.075	0.05	0.075	0.075	0.100
Al_2O_3	0.05	0.05	0.05	0.05	0.53	1.45
TiO_2	1.64	1.57	1.67	1.61	1.67	1.70
CaO and MgO	0.10	0.10	0.10	0.10	0.10	0.10
Others	—	—	0.87	0.945	0.005	—

The sizing tests indicate that impurities are comparatively higher in the plus 30-mesh and minus 100-mesh fractions of the sand, and that a sand comparable with any product obtainable by other beneficiation methods can be obtained by washing, magnetic separation of magnetite, and removing the plus 30-mesh and minus 100-mesh grains. The product obtained is slightly higher in iron oxide than the maximum specified for plate-glass sand and contains more than twice the maximum allowed for flint-glass sand.

Recommendations for Beneficiation

Relatively inexpensive methods of treatment, including washing, screening, and magnetic separation, will produce a sand containing about 0.7 per cent iron oxide from the San Jacinto river sand. The product thus obtained amounts to about 77 per cent of the total sand. The cost of treatment should be considerably less than that at representative sand-beneficiation plants where the methods of treatment include table concentration and froth flotation.

The grade of sand produced would be suitable for all glass uses except optical, flint, and plate glass. The plate-glass sand tolerance for iron oxide is approached very nearly, 0.07 per cent as compared with 0.06 per cent, and it would appear than considerable amounts of this sand could be used for plate-glass manufacturing if it were blended with a low-iron sand. For example, the maximum iron oxide tolerance for plate glass could be met if two parts of the beneficiated San Jacinto sand were blended with one part of another glass sand containing 0.04 per cent iron oxide. The utilization of San Jacinto sand for plate-glass manufacturing, therefore, would be entirely an economic problem in which the delivered cost of good glass sand must be balanced against the cost of beneficiated river sand at the glass factory. Freight costs for the imported sand would probably be the determining factor.

Concrete Pipe Company Enters Block Field

WALLA WALLA CONCRETE PIPE CO., Walla Walla, Wash., is working on plans for a pumice block manufacturing plant, which will be an additional line for this firm. It is planned to start operation with a block machine of 600 block per hour capacity. The company has had many years experience in manufacturing concrete building block, sewer and irrigation pipe, burial vaults, septic tanks, and other specialized products. A second new departure by this company has been its entrance into the ready-mix service, with three 2-yd. ready-mix trucks.

Rock Asphalt Bankruptcy

OHIO VALLEY ROCK ASPHALT CO., Louisville, Ky., recently filed a voluntary plea in bankruptcy in the federal court with liabilities of $249,837 on which claims of $194,837 have been secured. Assets include $143,180 in real estate on which the R.F.C. has a mortgage of $100,197.

Trucks Replace Rails

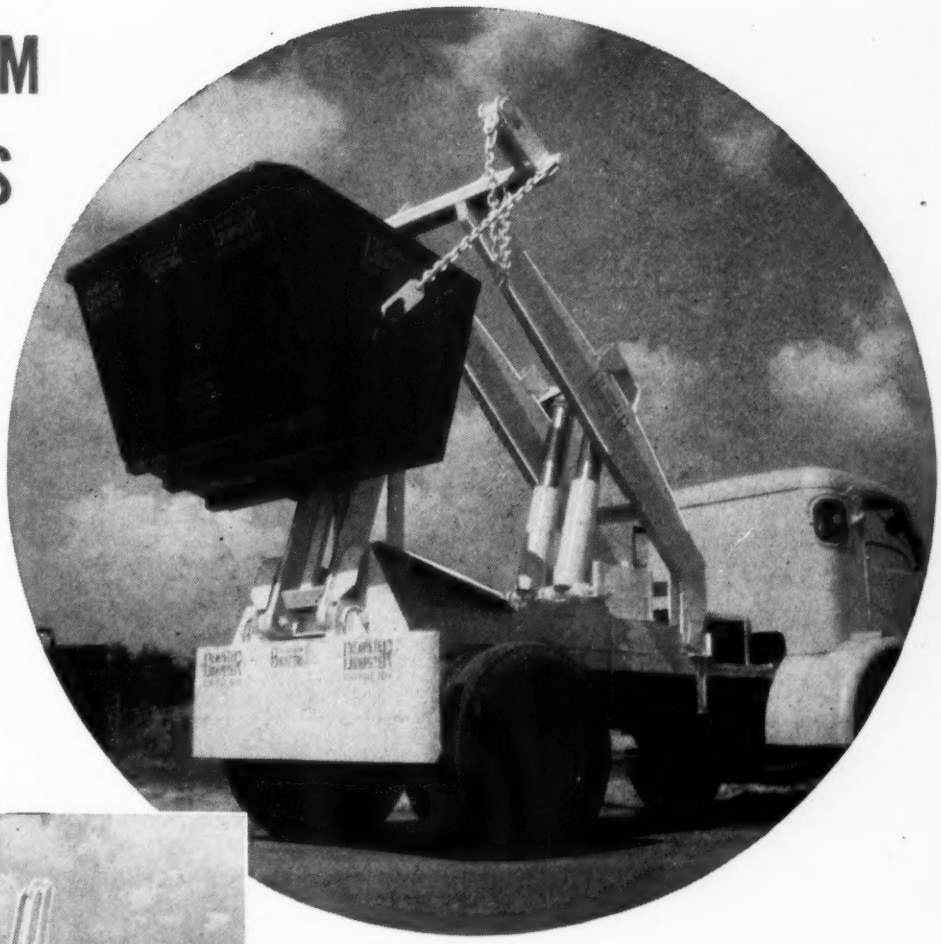
SOUTHWESTERN PORTLAND CEMENT CO., Los Angeles, Calif., is abandoning the narrow gauge railroad system used for haulage in its El Paso, Tex., quarry. The system is being replaced with three Mack trucks.

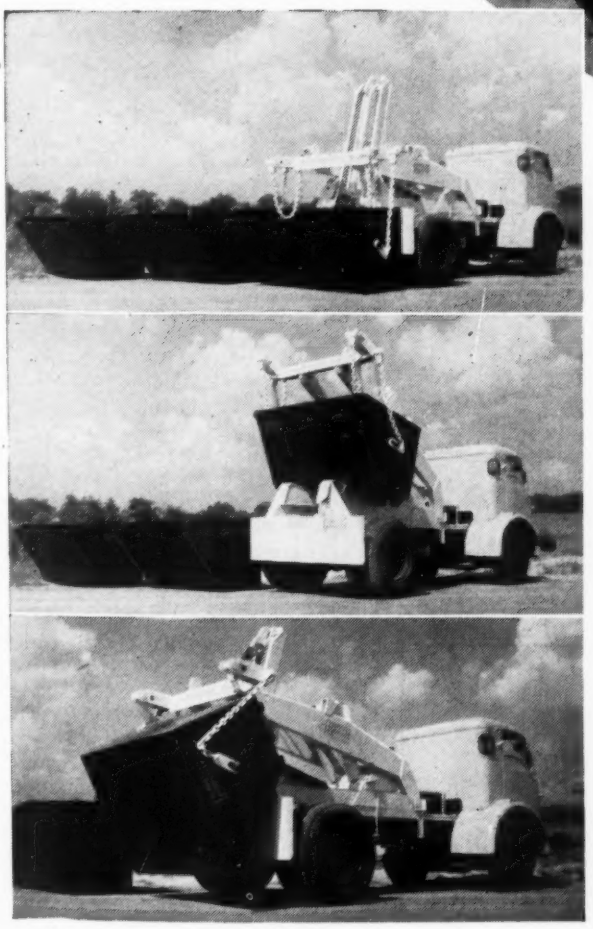
Pavement Yardage

AWARDS of concrete pavement for April and the first four months of 1947 have been announced by the Portland Cement Association as follows:

	Square Yards Awarded	
	During April, 1947	During First 4 Months of 1947
Roads	3,166,565	6,430,769
Streets and Alleys	1,600,187	3,501,238
Airports	512,943	591,604
Totals	5,279,695	10,523,611

THIS SYSTEM OF MATERIALS HANDLING IS FASTER AND MORE EFFICIENT!





It makes no difference what materials you handle, profits depend on how fast . . . how efficiently you get the material out. Whether you handle rock, gravel, sand, or clay, the Dempster-Dumpster System does the job faster, more efficiently, and at tremendous savings . . . that's why it's winning the acclaim of operators everywhere.

One Dempster-Dumpster truck hoisting unit serves any number of bodies needed to meet your requirements. Here's how it works. Bodies are placed at convenient loading points. The hoisting unit picks up each body, in turn, as it is loaded . . . hauls it, dumps it and returns it for reloading. Truck hoisting unit is constantly on the move; no waiting for trucks; wasted manpower is eliminated; operating expense of rolling stock is cut to a minimum by this endless cycle of loading, hauling and dumping.

Pictured at left are three stages of operation. Above; 6 cu. yd. Tilt type body on ground. Center; Hoisting unit lifts body into carrying position. Below; Dumping Action. All operations hydraulically controlled from driver's cab. Write today for complete information on how the Dempster-Dumpster can help you cut materials handling costs and increase production.

DEMPSTER-BROTHERS, INC.
367 Shea St., Knoxville 17, Tenn., U. S. A.

DEMPSTER DUMPSTER
TRADE MARK REG.

Preheating

(Continued from page 98)

This silo, which is 18 ft. in diameter and 36 ft. high, is constructed of precast concrete staves of special design. Each stave is 10-in. wide and 4½-in. thick, reinforced. A 1¼-in. notch is cast horizontally in each stave so that when erected a 1½-in. square spline of redwood is inserted in the square opening formed by the two adjoining notches, These splines fit tight, making the silo water tight. It was designed and patented by Mark Lintz,

Any of the products in the 4-compartment silo can be drawn off below. Materials to be sacked are drawn off direct to a E. W. Vredenburg sacking machine. This device is a single tube sacker and is easily moved out from under the loading spout via small casters. It is of relatively light construction compared to more well known sackers but is highly adaptable for sacking both coarse or fine materials and is practically dustless. It resembles a Bates packer somewhat but instead of using an impeller it uses a short screw feeder. It also can be used for sacking material into open mouthed paper bags through an auxiliary spout that is a part of the unit.

Limestone Plant

For the preparation of the agricultural limestones, the crystalline limestone is fed to a 11- x 15-in. Tiger jaw crusher by a reciprocating pan feeder. It reduces the rock from 10-in. to 2-in., which product falls to a Dixie hammer mill. The hammer mill reduces the stone to 10-mesh. The products fall to a bin from which the material is elevated in a bucket elevator to a battery of two Tyler Hummer screens where three sizes of chicken grits are prepared: minus ⅜-in. plus ¼-in.; minus ¼-in., plus ⅛-in.; minus ⅛-in., plus 30-mesh, and a minus 30-mesh material that is sold for commercial feeds, flour limestone, etc. All the products are spouted to bins. Materials that are to be sacked are drawn from these bins to an Exact Weight Scale Co. open-mouthed sacker. This mobile unit is so designed that open mouthed paper sacks are quickly clamped around the loading spout and are filled. At the time a sack is being filled it is also being weighed so the operator can fill the sack to any predetermined weight without having to resort to hand scoops for the final weight adjustments. The sacked materials from both sacking sections are removed from their respective sacking machines and placed on wood pallets. A two-pronged Towmotor gasoline engine driven lift-truck delivers and stores the sacks in the warehouse. The two sacking sections are a considerable distance apart but the Towmotor easily takes care of both divisions.

George L. Kelly is manager of the Auburn Lime Products Co. He was formerly connected with the Henry J.

Kaiser dolomitic lime plant at Natividad, Calif. Ray Webber is superintendent and M. D. Youngs is in charge of the office. Mr. Vertin is president of Resource Engineering Co., and V. D. Herman, vice-president.

Labor Relations

(Continued from page 99)

arbitrators dissenting, the award went to the company, and the vacations were held to be correctly computed on the basis of the work-week in effect at the time the vacations became due.

In another case which also involved rates of vacation pay rather than length of vacations, the arbitrator ruled that a contract providing: "An employe working not less than 39 weeks, with at least one year's seniority, standing at the end of the service period, April 30, shall receive a vacation of 60 regular working hours with pay"—the rate of pay being computed on the basis of job rates in effect on April 30. The question at issue was "Should the company have added a wage increase to the vacation pay of those employes who were not on the active payroll as of April 27, 1946, because they had been temporarily laid off?" March 24 was the date on which a general wage increase went into effect, and April 27 was the cut-off date. The arbitrator ruled that in the case of employes temporarily laid off or on leave of absence, the employer-employe relationship continues insofar as the right of recall and wage rates are concerned, and that those employes so laid off were entitled to have their vacation pay on the same basis as other employes—in other words the employer must add the wage increase made after they were no longer on the payroll.

Other arbitrator decisions bear out the theory that an employe is entitled to his vacation pay even when he voluntarily quits his job prior to the day set for his vacation to begin, if he has complied with the conditions of a contract that requires six months' or a year's continuous service (as the condition may be). Moreover, he is entitled to the vacation pay at the rate in effect when he takes his vacation, and not the rate paid him while he worked, where the contract was worded similarly to those quoted. In one instance, a contract worded "a scheduled work-week, but not less than 40 hours," was held to apply to part-time workers who had actually worked only an average of 16 hours a week, when they were not in school, but who qualified by length of such service. The company had not intended to include part-time workers at all, but failed to state so in its contract.

Start Crushing

C. G. SWEENEY CONSTRUCTION CO., Neosho, Mo., is planning to start limestone crushing operations north of Jasper, Mo., with an initial capacity of 200 tons daily.

Sand Classification

(Continued from page 104)

it is remembered that in classifying, there must always be enough of a time element for a particle to fall below the surface current; and the less the velocity of the surface current, the farther the particle will fall in a given time, and the better the chance of its being saved.

The kind of an operation just described should not be confused with one that looks similar on paper, but operates on an entirely different hydraulic principle (Fig. 4). In this case the shorter launder is on a steeper slope, and the flow cascading down from the sand screen is more turbulent. The openings in the launder here, covered with $\frac{1}{16}$ x $\frac{3}{4}$-in. slots in perforated sheet steel, are designed to act as dewatering screens and to take out some of the minus $\frac{1}{16}$-in. sand, and water allowing the rest and the plus $\frac{1}{16}$-in. to pass on. Obviously, any additional friction on the bottom of the launder at this point is what one does not want. Here the launder does not help in the classifying; it merely "leaks" dirty water and fine sand, the sand being recovered in the cone classifier following.

Cutting Down Overflow Velocities

It is apparent, from the analysis given, that the primary step in fine sand recovery is to reduce the surface current velocity. This applies as well to rising current classifiers as to simple surface-current classifiers, for regardless of how the water is introduced it must overflow somewhere, and it is at the overflow weir that valuable sand is lost. Too much agitation in the classifier tank or bowl has the same result as too much rising current and/or too much surface velocity, for it tends to keep particles that should settle out in suspension. Eddies created by obstructions in the current and settling areas have the same effect. Consequently, in some instances where vanes or deflectors were originally installed in settling tanks, better results have followed their removal, and other methods then introduced to slow the current velocities.

The simplest and most direct way to cut down the current velocity and recover more fine sand in any type of classifier is to provide a longer weir for the overflow. Apparently, from observation of many operations, this seldom occurs to the plant operator, but manufacturers of equipment are now applying this principle to screw classifiers, and occasionally to sand drags. It may be readily applied to rakes, sand wheels, bucket chains, in fact to any type of hydraulic separator with a settling tank, including most sand cones. Bowl classifiers, hydroseparators and thickeners are merely examples of the ultimate development of increasing weir length to reduce overflow velocities. Hence, when the settling tank of a screw classifier is deepened and widened, and

the overflow weir lengthened, even to the extent of providing overflow on three sides of a rectangular tank, or around the entire circumference of a cylindrical tank, the overflow velocity is cut down, and what is equally important, the depth of the current is reduced. Both result in reducing the waste of fine material.

The reason why the length of the weir makes such a difference in classifier performance is readily apparent from a study of the hydraulics of flow over weirs. The formula universally applied is the Francis empirical formula, based on much experimental data; and it is accurate for all except very small heads, as already mentioned. There is another formula developed specifically for the overflow of cylindrical tanks with very low heads, like bowl classifiers and thickeners, but it requires the use of logarithms, for instead of $\frac{3}{2}$ (or 1.5) powers of heads, it uses 1.455 powers. Ordinarily, such refinements are not necessary in sand classifier computations. It is only necessary to remember that the Francis formula gives results for heads below 0.08 ft. considerably more than the actual flow.

The Francis formula is

$$Q = C\sqrt{2gH}\, LH^{\frac{3}{2}}$$

Where Q = Quantity of overflow
C = A constant depending on the type of weir; ordinarily it is about 0.62
g = Acceleration due to gravity—32.2 ft. per sec. at sea level
L = Length of weir
H = Height of level water over the weir—the head on the weir

Assuming then that Q (or the feed and water) is kept constant; C and g, of course, are constants; then the overflow will vary directly as the product of $L \times H^{\frac{3}{2}}$. The $\frac{3}{2}$ powers of various numbers are given in hydraulic data tables in many handbooks, or they can be readily determined with a logarithmic table, or with a slide rule. For our purpose we need not consider but a few of these values; for example, the $\frac{3}{2}$ power of 2 (could be written $\sqrt{2^3}$ or $\sqrt{8}$) is 2.828; of 3 the $\frac{3}{2}$ power is 5.196; of 4, it is 8. This means, obviously, that if we double the length of the weir $(2L \times H^{\frac{3}{2}})$, we reduce an H of 2 to an H of 1.26, or if we multiply the length of the weir by 3 we reduce an H of 3, to an H of 1.44; by multiplying the length of the weir by 4 we reduce H from 4 to 1.59, and other heads in proportion; the larger the H, the greater the proportion of reduction. Hence, instead of cascading the overflow over a narrow weir at one end of the settling basin, if the

weir is made on three or four sides, discharging into a collecting gutter, a great step has been made in recovering finer sands.

Stated in another way, we may call $H^{\frac{3}{2}}$ the velocity factor. By increasing the weir length by doubling it, we reduce the velocity factor from 2.828 to $\frac{2.828}{2} = 1.414$; by increasing the weir length four times, we reduce the velocity factor for a head of 2 from 2.828 to 0.707. In order to use these factors in the Francis formula, H must be in feet, or decimals of a foot, unless all the other factors are changed to inches or centimeters, but the same principles, of course, apply regardless of the actual values.

A later article will describe other experience in modern sand recovery practice, including an up-to-date revision of a Shaw classifier installation. We will also discuss the important problem of blending fine sands with coarser sand.

Lime Convention

(Continued from page 110)

in an early issue of ROCK PRODUCTS. Mr. Azbe commented briefly on the differences in properties of lime required for various chemical processes and particularly stressed the harmful effects resulting when there is core in lime as it enters the cooler, from recarbonation, even though highly pure limestone be burned into lime.

He mentioned new developments in the burning of lime in shaft kilns, with stone as small as ¾ in. fed into the kilns. He illustrated his talk with slides showing gas flow in the Azbe hot zone circulation system, the relation of availability to insoluble content of high calcium lime, the calcination and recarbonation of lime, the formation of lime occlusions due to slag dissemination in the hard burning of impure limestone and a series of kiln designs for burning stone of various sizes down to ¾ in. and up to 6 in. size.

Research

PROF. WALTER C. VOSS, Massachusetts Institute of Technology, presided over a session devoted entirely to the subject of research. In his opening remarks, Professor Voss called for an orderly planned research program, stressing the differences in limestones and differences in lime that must be understood as a means to find new and more efficient uses of lime.

Such a program, in its preliminary stages, must have many hypotheses, he said, mentioning the complicated differences in rocks, the differences in results in the application of basically identical limes, the variations in products as a result of differences in methods of manufacture and other factors as yet little understood. Electronics, crystallography, geology and other sciences are involved, he said. Too often research is left to the user.

He advocates organization of a pat-

tern of research from scattered knowledge at hand and that scientific consultants be selected to work with the research committee on a continuing long range plan.

DR. WILLEM RUDOLFS, professor, Department of Water Supply and Sewage Disposal, Rutgers university, reported observations and progress in research on sewage and trade wastes conducted at Rutgers, under auspices of the National Lime Association. The main assignment has been the neutralization of pickling liquors to determine methods for minimum sludge formation and maximum settling, work having started a year ago on the basis that the production of sludge is a form of oxidation and that higher concentrations are a corallary to higher oxidation.

Time and temperature factors have been under study, time being an important factor governing rate of reaction, settling and concentration. High temperature accelerates reaction and 80 deg. C. is considered the optimum temperature for the greatest rate of neutralization with reduction in sludge volume. Best results come from a combination of proper time and temperature with the slow addition of lime.

The factors of contact and stirring have also been under study and interesting results have been observed. If stirring is slow and lime slurry is added slowly, early settling is obtainable with the use of dolomitic lime while poor results follow fast stirring. If stirring is fast and lime is added slowly, better results are obtained from the use of high calcium lime.

Catalysts are also being considered and, from work done so far, it is believed they are effective when the process of settling is accomplished in two or more stages, not speeding the process fast enough unless the material is partly oxidized before addition of the catalyst. Only a few catalysts have been found effective, one being traces of copper if iron is present in the water.

(Continued on page 130)

A. H. Nieman, The Ohio Hydrate and Supply Co.

Lime Convention

(Continued from page 129)

A review of literature on equipment including feeding devices, has been underway and also a study of odor control from commercial waste drying establishments. Tannery waste odors have been reduced 95 per cent by a process of neutralization before drying, followed by oxidation with chlorine. A small amount of hydrate is required but, as Dr. Rudolfs pointed out, small quantities may be multiplied into appreciable volume. Three large paper board mills have installed lime neutralization equipment based on these research studies, to raise the pH of "white water" for re-use.

HOWARD R. STALEY, Massachusetts Institute of Technology, in discussing work of the fundamental research fellowship at that institution, reported progress and presented numerous problems in need of further research.

A progress report is now in process of work on the rate of solution and hydration of lime and a bibliography is soon to be published. The different raw materials and different behaviors of limes that result are in need of further study, he said, and the field of hydration affords the biggest opportunity for control of the behavior of limes. Impurities modify wetting conditions and therefore hydration, he pointed out, and proper wetting is important in its effects on absorption and adsorption on the surfaces. Differing adsorption characteristics with the various impurities form a coating on particle surfaces which affects hydration characteristics.

An ideal condition, which he pointed out might be feasible within limits, would be to separate quicklime into sizes before hydration, to attain more uniform wetting. He suggested that the impurities may be concentrated in certain sieve sizes fractions, based on laboratory study, but he recognized that plant practices may be different.

Work is being done on pore studies, as an adjunct to studying wetting of particles, it being recognized that there is great difference in the adsorption characteristics between hard burned and soft burned limes.

Mr. Staley commented on static

Burton A. Ford chats with Waldo, an acquaintance of many years at The Homestead

H. M. Beatty, The Kelley Island Lime and Transport Co., left, with camera fan J. M. Gager, Jr.

charge studies, which may find the solution to the clogging of materials flowing through chutes. Static charge is a function of frequency and intensity of impact, velocity being a factor, each particle inducing an opposite charge on its neighboring particle. He speculated on the possibility of adsorbing something on the surfaces which might cause more uniform charges to be induced. Charge being a function of particle size, he pointed out that very fine particles should have greater flowability.

Agriculture

Some very interesting comments on soil liming were presented by DR. RICHARD BRADFIELD, chairman of the Department of Agronomy of Cornell University in his report of the agricultural fellowship work at the New York Agricultural Experiment Station.

Dr. Bradfield said that 900,000 tons of liming materials were spread on farms in New York State in 1946, an all-time high, of which 98 per cent was ground limestone. There were 19,000 tons of lime hydrate and 283 tons of burned lime. The total use, however, is still only one half of requirements.

Where agricultural limestone has been applied on potato land it has been found that the large particles become focal points for scab formation, the solution according to Dr. Bradfield being to use hydrated lime or fine ground lime applied sufficiently well in advance of planting so as to be completely decomposed. There is evidence that magnesium is needed as well as calcium and, he anticipates, there will be a growing demand for calcium magnesium hydrate. Magnesium deficiency is particularly noticed in orchard soils, where acid fertilizers and spraying have been applied for many years.

In commenting on the need for government subsidies in payment for liming materials, he pointed out that liming is good business that will bring greater than 100 per cent return a year.

There is a need to determine definite results from liming, he pointed out in stating that farmers will not be slow to accept the practice if clear-cut results can be shown. Lack of wider acceptance, he said, would indicate that the farmer is not fully convinced. He has not had satisfactory

experience or has been handicapped by distribution problems and transportation difficulties. A means of diagnosis of results from liming is required.

Dr. Bradfield commented on the theories and differences of opinion as to why liming materials should be applied, some authorities saying to correct acidity, others to provide quick calcium and still others to combat soil toxicity, etc. He raised the question as to using the same procedure for all these factors and others, which he thinks unlikely. He also raised the question as to whether the correction of acidity is the reason for crop response to liming of soils, citing University of California studies that have shown high lime hay to be grown on soils of 4.5 pH but with other minerals balanced. Studies are being directed under Dr. Bradfield to determine why alfalfa responds to soil liming.

Another question brought up is how much soil volume should be limed. Root depth is a factor, he pointed out, in mentioning that deeper growing legumes will thrive where the subsoil is limed. The suggestion was made that liming materials might possibly be applied deeper. Timing of application is important to show results to the farmer, he concluded.

Mortars and Masonry

In his report on mortars and masonry research at the National Bureau of Standards, H. C. PLUMMER, director of engineering and research, Structural Clay Products Institute, summarized the principal activities since the program was started, citing the important tests and papers published to date.

Lime for Castings

W. E. MAUIN, chairman, Metals Research, Armour Research Foundation, pointed out a relatively new market possibility for lime, as an investment material in ferrous castings, in an illustrated talk.

He described the lost wax process where a wax pattern is set in the investment slurry and then melted out. The virtue of lime, he said, is that it is highly refractory and chemically stable. Its disadvantage is that it picks up moisture and CO_2. A method is needed for bonding the lime, which must have good porosity, green strength and baked strength.

Entertainment

Meetings were scheduled to permit two afternoons of golf, and a bingo party was held the evening of May 6, with a reception and the annual banquet on May 7. Through the courtesy of Burton Ford of the St. Regis Paper Co., very handsome prizes were awarded the winning ladies at the bingo party. Among the men, R. G. Greeves, The Kelley Island Lime and Transport Co., came off with the top prize of $95.

Operating Session

(Continued from page 114)

Compulsory arbitration, if adopted, would in his opinion, lead to totalitarianism in this country. He believes that strikes sometimes are the best way to settle certain disputes, so industry should not want strikes to be declared illegal, the main danger being that bad cases often lead to bad laws.

Commenting further on government power, Mr. Ahearn said that it would be unfortunate if the government be given power to seize industries essential to the public welfare in event of strikes because that power could permit seizure of all industry. He believes that all concerned should work for collective bargaining, since any alternative would not be the best procedure either for industry, labor or the United States. Legislation cannot make industry and labor work together.

Differences in the House and Senate bills, on which action has since been taken, were covered briefly. The Gwynne Bill is looked upon with favor by Mr. Ahearn because an employer has a chance to plead good faith.

He concluded by itemizing changes in wage rates and other concessions granted labor by some of the nation's key industries. Among the more significant items mentioned in the various contracts (not in all) were extra hourly compensation over and above straight increases for holidays worked, for wage inequities and reduction in geographical differentials, three weeks' paid vacation after 25 years' service, severance pay, the furnishing of safety clothing at the expense of employers, double pay for work in excess of 12 hr. per day, etc. Mr. Ahearn emphasized that health, welfare and retirement provisions are rapidly becoming more prevalent in labor-management agreements, and such provisions are now in process of consideration in many industries.

Open Oil Shale Plant

BUREAU OF MINES has announced that its $2,000,000 oil-shale demonstration plant in western Colorado celebrated the opening of its first major unit on May 17. This is the first of two units planned under a five-year $30,000,000 program of synthetic liquid fuels research and development. This project is of general interest to the rock products industry as the first step taken in assuring a continued supply of oil fuel from hithertofore untapped resources, and it also has a special significance to the cement industry for the possibilities of utilizing oil shale in cement kilns. The plant will process 80 tons of shale a day, averaging 29 gal. of oil to the ton.

Adds Crushing Plant

BARE HILL QUARRY CO., Baltimore, Md., is adding a crusher plant at Falls Road to cost $15,000.

FINANCIAL

RECENT DIVIDENDS

Alpha Portland Cement Co. ..	$ .25	June 10
Bessemer Limestone & Cement Co. Pfd.	.50	July 1
Canada Cement Co. Ltd. pfd.	.32½	June 20
General Portland Cement Co.	.25	June 30
Industrial Silica Corp. new pfd.	.16	June 10
Industrial Silica Corp. old pfd.	.17	Sept. 10
Lehigh Portland Cement Co. ..	.37½	June 2

DOLESE & SHEPARD CO., Chicago, Ill., has reported a net profit of $75,-269.71 for the year ended December 31, 1946, as compared with $46,693.88 for the year ended December 31, 1945.

INDUSTRIAL SILICA CORP., Youngstown, Ohio, had a net income of $134,-642 for the year ended December 31, 1946, as compared with $140,654 for the year ended December 31, 1945.

CONSUMERS CO., (Del.), Chicago, Ill., stockholders on April 15 approved plan for reclassification, share-for-share, of authorized and outstanding 38,492 shares of $50 par non-cumulative participating Class A common stock and 59,080 shares of no par Class B common stock into new $50 par $2.50 cumulative preferred stock and no par common stock, respectively. Plan also provided for elimination of authorized 86,202 shares of $50 par $3 cumulative preferred stock, entire issue of which was retired on November 7, 1946.

MARQUETTE CEMENT MFG. CO., Chicago, Ill., reported a net income of $1,268,264, or $7.09 each on 150,340 common shares for the year ended December 31, 1946, as compared with $407,372, or $1.36 a share, for the year ended December 31, 1945. Net sales were $10,339,475 for 1946 as against $6,941,400 for 1945.

PENNSYLVANIA GLASS SAND CORP., Lewistown, Penn., reported that earnings for the first quarter of 1947 would be substantially ahead of the first quarter of 1946, although the figures are not yet available. President William J. Woods also said that April is running ahead of last year, and indications are the second quarter of 1947 will be better than in 1946.

LEHIGH PORTLAND CEMENT CO., Allentown, Penn., reported a net profit of $3,181,523, or $3.35 a common share, for the year ended March 31, 1947, as against $1,271,996, or $1.34 a share, for year ended March 31, 1946.

BLUE DIAMOND CORP., Los Angeles, Calif., has reported net income of $803.410 for the year ended December 31, 1946, as against $236,454 for the year ended December 31, 1945. Net sales for the 12 months ended December 31, 1946 were $8,195,120 as compared with $5,524,901 for the 12 months ended December 31, 1945.

Manufacturers' News

St. Regis Paper Co., New York, N. Y., has appointed Melvin J. Killian as technical director of the Kalamazoo, Mich., paper mill.

Foster D. Snell, Inc., New York, N. Y., consulting chemists and engineers, announces that Dr. Cornelia T. Snell gave the annual Marie Curie lecture at Pennsylvania State College on May 5. Her subject was "Synthetic Detergents and Surface Activity."

Hammond Bag & Paper Co., Wellsburg, W. Va., founded by the late T. H. Hammond in April, 1922, is now celebrating its 25th anniversary, marking a quarter-century of progress in the manufacture of single and multi-wall bags.

Jones & Laughlin Steel Corp., Pittsburgh, Penn., announces the following changes in personnel: W. J. Creighton has retired as executive vice-president, but continues as consultant to the chairman of the board of directors. He also continues to be a director and a member of the executive committee; Frank R. Denton, a newly elected director, has also been elected a member of the executive committee; C. L. Austin, director and treasurer, and H. Parker Sharp, director and general counsel, have been elected members of the executive committee and vice-presidents; V. H. Lawrence, general superintendent of the Otis works, was elected a vice-president; W. R. Elliot, formerly assistant general superintendent at Otis, has succeeded V. H. Lawrence as general superintendent; W. H. Dupka, controller, and H. W. Graham, director of technology, have been named vice-presidents; W. Randall Compton has been appointed assistant to the president; and W. C. Plummer, attorney for the corporation, has been appointed assistant secretary.

Falk Corp., Milwaukee, Wis., has appointed Dave S. Ferree as district manager of the new Philadelphia sales office.

Reardon Industries, Cincinnati, Ohio, announces that Robert L. Smith, who recently returned from Military Service as a Lieutenant in the U. S. Navy, has been named manager of the industrial insulation department in the Cincinnati district.

Caterpillar Tractor Co., Peoria, Ill., announces that E. W. Jackson, general parts manager, has been appointed director of parts and service; M. T. Deames has been promoted from assistant general parts manager to general parts manager; and W. Blackie, vice-president and chief administrative head of the accounting and merchandise departments, has also assumed administrative guidance of the traffic department. J. H. Deaderick, vice-president in charge of parts, service and traffic departments, and E. L. Murray, credit manager of the treasury department, have resigned their positions to join Fred Elder of Phoenix as "Caterpillar" distributor for the greater part of Arizona.

E. W. Jackson

M. T. Deames

Mr. Jackson joined the company in 1929 as a member of the research engineering staff in San Leandro, Calif. He transferred to Peoria, Ill., as a member of the service department in 1933 and four years later was promoted to general service manager. He became assistant to the president in 1942 and two years later was named general parts manager.

W. Blackie

Mr. Deames joined the company in 1929 as stock man in the parts storeroom. He advanced through numerous positions in the parts department to become assistant parts manager. In 1944 he took charge of merchandising activities in the eastern division and manufacturers division and in 1945 was promoted to assistant general parts manager.

Mr. Blackie joined the company in 1939 as controller and was made a vice-president in 1942. He was formerly associated with Price, Waterhouse & Co., accountants, and subsequently became a certified public accountant and a member of the American Institute of Accountants.

Foxboro Co., Foxboro, Mass., manufacturer of industrial instruments and, since 1908, exclusive representative in the United States for the Dr. Th. Horn portable tachometer, announces that all its facilities for the servicing of these instruments have been acquired by the James G. Biddle Co., Philadelphia, Penn.

R. G. LeTourneau, Inc., Peoria, Ill., has appointed Robert P. Nichols as assistant domestic sales manager, to assist S. D. Means, domestic sales manager.

Mack Trucks, Inc., New York, N. Y., announces the appointment of W. T. McCurdy as district manager for the States of Tennessee and Arkansas, with headquarters in Memphis, Tenn.

Lima Locomotive Works, Inc., Shovel and Crane Division, Lima, Ohio, announces the opening of an office and warehouse at 1315 Howard St., San Francisco, Calif., with Paul Fenwick as district manager. Ralph Rodgers

and M. E. Army are assistant district managers.

Vascoloy-Ramet Corp., North Chicago, Ill., manufacturers of VR carbide and Tantung tools, has announced sales and service representation in the following areas: B. J. Naden to Cleveland; J. M. Kinney to Toledo; Frank Scheffler to Kansas City; and Dean R. Cline to the Chicago area.

Gardner-Denver Co., Quincy, Ill., has appointed A. H. Jones as director of the export office in New York, and vice-president of the newly formed Gardner-Denver Western Hemisphere Co. with offices in New York. He was formerly manager of the Los Angeles office.

Diamond Iron Works, Inc., Minneapolis, Minn., has announced the appointment of Fred H. Jusenius, general sales manager, as director of the company and vice-president in charge of sales for both Diamond Iron Works and the Mahr Mfg. Co. division. The parent company manufactures rock and gravel crushing equipment, disintegraters for saw mills, pulp mills and packing houses, while the Mahr division specializes in industrial furnaces, heat-treating units and allied equipment. Mr. Jusenius, since leaving engineering college, has had wide experience in heavy construction and engineering work, followed by ten years of sales work with Bucyrus-Erie and LeTourneau in both domestic and foreign fields.

Fred H. Jusenius

Ford Motor Co., Dearborn, Mich., announces that Richard E. Roberts, formerly director of employe relations for the Fisher Body Division of General Motors Corp., has joined the company as director of the community relations department. J. C. (Larry) Doyle, formerly manager of the Dearborn district, has been appointed Central regional manager to succeed A. B. Pease who is being transferred to the Central office in Dearborn, to head a newly-created parts and service division; John William Asquith has been promoted from manager of the business management department, Somerville, Mass., to assistant district manager, succeeding W. E. Kimbrough, who recently was transferred to the Central office as manager of the truck section, truck and fleet sales department. H. M. Strout is manager at Somerville, and C. W. Rowan also is an assistant manager; Edwin C. Simons has been made manager of the Government sales section with headquarters in Washington, D. C.; A. F. Bauerbach has been promoted from assistant manager to manager of the Dearborn district, succeeding J. C. Doyle.

Goodall Rubber Co., Philadelphia, Penn., has announced a new affiliated

company, formerly the Minnesota Rubber & Supply Co., is located in St. Paul, Minn. Leonard Berg has been made vice-president and branch manager.

Acme Rubber Mfg. Co., Trenton, N. J., has promoted L. J. Amsdell to the position of Eastern sales manager, with headquarters in New York. Mr. Amsdell was formerly Western sales manager, Chicago, Ill.

Kensington Steel Co., Chicago, Ill., has announced the election of Eugene C. Bauer, Jr., as a vice-president.

Euclid Road Machinery Co., Cleveland, Ohio, has appointed V. L. Snow as manager of sales development. He was formerly manager of industrial products.

Pittsburgh Plate Glass Co., Pittsburgh, Penn., has announced that Guy Berghoff, director of public relations, will assume direction of all advertising activities.

Babcock & Wilcox Co., New York, N. Y., has announced the election of Anthony M. Kohler as general manager of the refractories division, and of Alan E. Phin, comptroller, as vice-president of the company.

MacWhyte Co., Kenosha, Wis., has announced the election of Robert P. Tyler as vice-president in charge of sales. He was formerly general sales manager. All directors and officers were reelected.

New Incorporations

Hartland Sand & Gravel Co., Hartland, Wis., has increased its stock from 500 shares common, no par value, and 250 shares preferred, par value $100, to 2000 shares common, no par value, and 300 shares preferred, par value $100.

Lakeshore Building Supply, Inc., Manitowoc, Wis., has been organized to deal in brick, millwork, stone, lumber and all kinds of building materials, supplies and equipment. Capital is 16 shares of stock, no par value. Incorporators are Conrad, Ida and Howard Hamann. Attorney is Leslie J. Valleskey, Manitowoc.

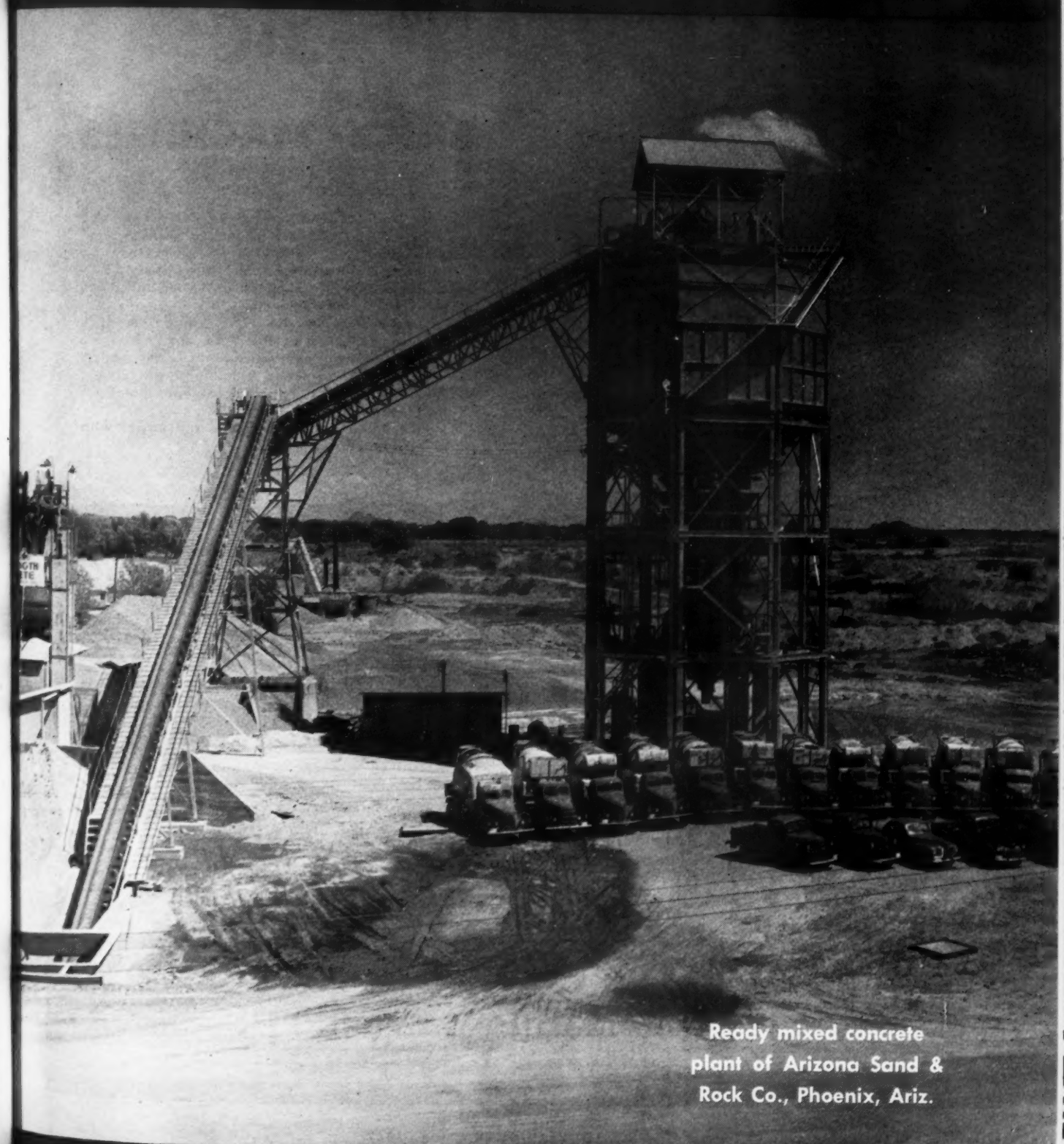
Buckley Gravel Co., Milwaukee, Wis., has been incorporated to deal in sand and gravel and all materials used in building and construction business. Capital is 600 shares, par value $10. Incorporators are James A. Buckley, Henry A. Nelson and Richard E. Boehck. Agent is Frank B. Meinecke, Milwaukee.

Capitol Sand & Gravel Co., Madison, Wis., has been organized to deal in building materials of all kinds and in real estate, with a capital of 1000 shares, par value $100. Incorporators are J. A. Gallagher, H. M. Nelson and L. C. McGann. Attorneys are Hill, Beckwith & Harrington, Madison.

Brattleboro Sand & Gravel Co., Montpelier, Vt., has filed certificate of capital actually paid in, listing 123 shares of common stock, no par value, issued for $12,300 cash. Signers are Emory A. Felch and Osmer C. Fitts,

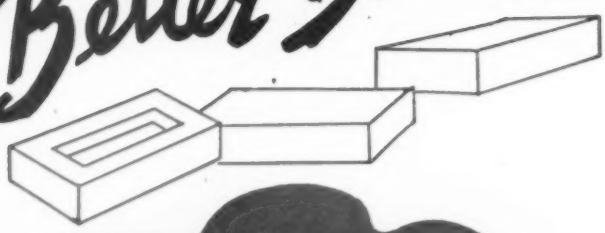
CONCRETE PRODUCTS

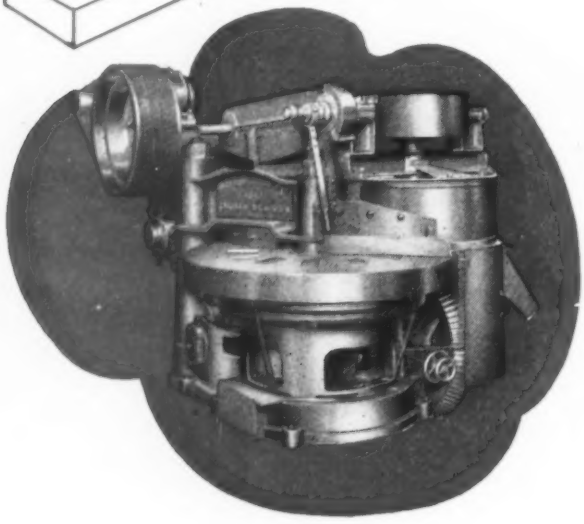
CONCRETE UNITS • READY-MIXED CONCRETE



Ready mixed concrete plant of Arizona Sand & Rock Co., Phoenix, Ariz.

Better Brick





FASTER AND EASIER with J&C BRICK MACHINES

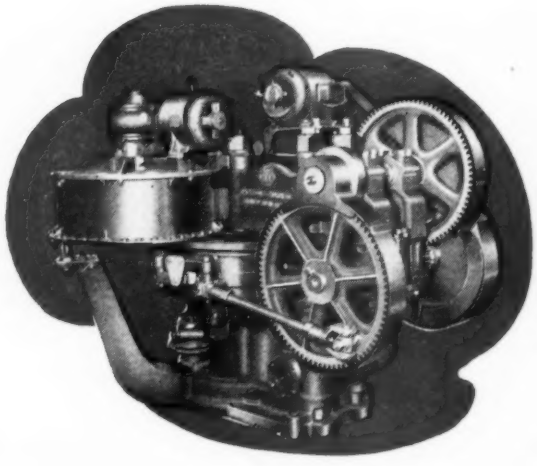
Top Production Means Top Profit

With the Model A (left), J & C Brick Machine you can produce up to 28,000 perfect concrete or sand lime brick per 8-hour shift.

Architects, contractors and masons specify J & C-made *Better Brick* . . . that lay up faster and make stronger, neater looking walls.

Features that make the J & C Model A Brick Machine outstanding in the field are: automatic feed control from hopper to agitator . . . no pallets necessary . . . 12 hardened steel-lined pockets . . . pocket fill adjustment for different aggregates . . . 75-ton forming pressure per brick.

Produce *Better Brick* . . . faster and easier with J & C Brick Machines.



Similar in principle to the Model A, but designed for smaller production requirements, the J & C Model NC Brick Machine will produce up to 14,000 clean, sharp brick per 8-hour shift.

Unit has 6 hardened steel-lined pockets instead of 12 as in Model A. Multiple V-belt drive (10 h.p. motor) . . . automatic feed control, and adjustable pocket fill are features.

It will pay to investigate the J & C line. Write us at Saginaw.

"Work Well Done Since '81"

A PRODUCT OF

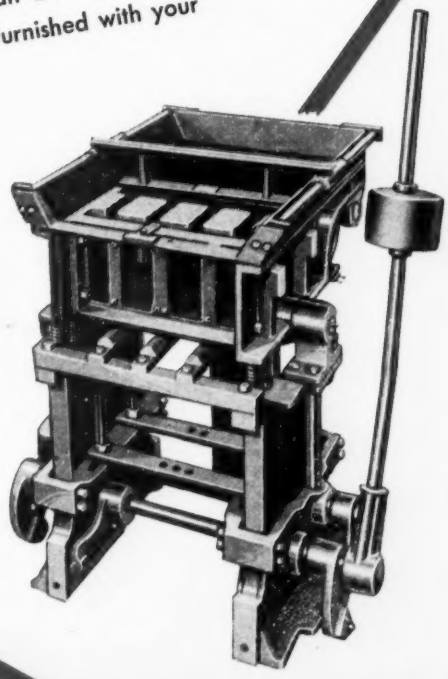
J&C JACKSON & CHURCH COMPANY
SAGINAW, MICHIGAN

Announcing THE COMPLETELY AUTOMATIC APPLEY LITTLE GIANT

GREAT NEWS!

. . . for the block industry . . . for present LITTLE GIANT owners . . . for prospective block plant operators. Appley now gives you FULLY AUTOMATIC MECHANICAL OPERATION for the LITTLE GIANT . . . Can be coupled to ANY LITTLE GIANT BLOCK MACHINE now in operation or furnished with your new LITTLE GIANT.

You'll get 100% MORE BLOCKS, better blocks, more efficient operation . . . all adding up to more satisfied customers and greater profits for YOU! Write for complete details about the LITTLE GIANT line . . . LITTLE GIANT BLOCK MACHINE, LITTLE GIANT MIXER, LITTLE GIANT SKIP HOIST, LITTLE GIANT PALLETS . . . Now FULLY AUTOMATIC for better production records.

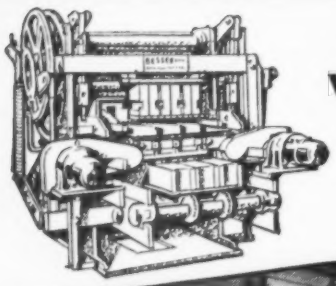


J. W. APPLEY & SON

INCORPORATED

P. O. BOX 849 STATION A

ST. PETERSBURG 2, FLORIDA

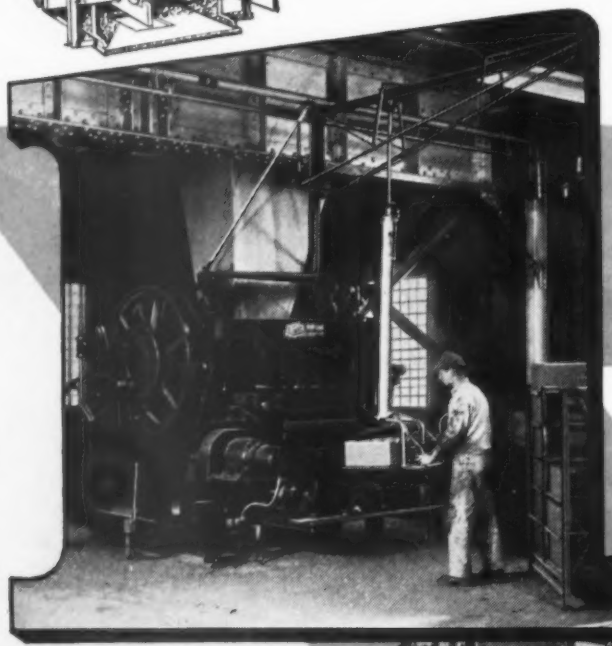


BESSER VIBRAPAC

Plus... **BESSER OFF-BEARING HOIST**

Gives You **FASTER CONCRETE BLOCK PRODUCTION!**

During Entire Cycle of Operation BESSER VIBRAPAC BLOCK are UNTOUCHED by HUMAN HANDS



No lifting. Operator merely guides the Power Off-Bearing Hoist.

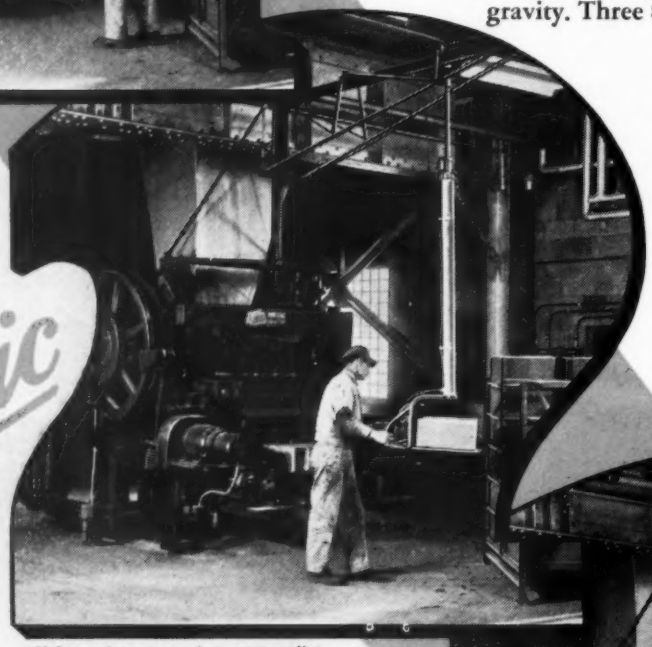
1 - 2 - 3 - presto! In 18 seconds, three more Besser Vibrapac Block are ready for the curing room. It's just that easy. A Besser Super Vibrapac is FULLY AUTOMATIC. No machine operator is required! No lost motions! No time wasted! Pallets are fed automatically and the mixed aggregates are fed by gravity. Three 8″x8″x16″ block with Fully Pressed Tops are produced at a time on one plain pallet. As each set of units is completed, it is quickly transferred to the rack. One man with the help of a Besser Power Off-Bearing Hoist, does the job. No lifting! Operator merely guides hoist. Capacity 600 - 8″x8″x16″ blocks per hour. Smaller units, made in larger multiples, on the same pallets. Write today for descriptive literature.

BESSER MANUFACTURING CO.

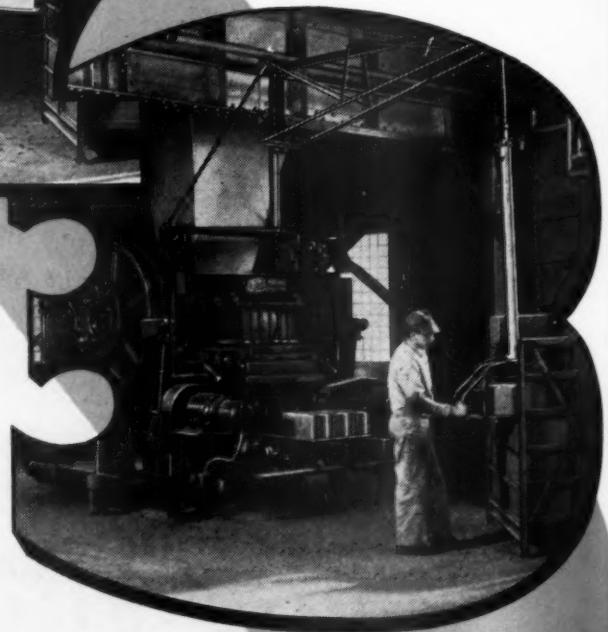
Complete Equipment for Concrete Products Plants

206-47th STREET ALPENA, MICH., U. S. A.

It's Fully Automatic



Hoist swings around to rest pallet with green block on rack.



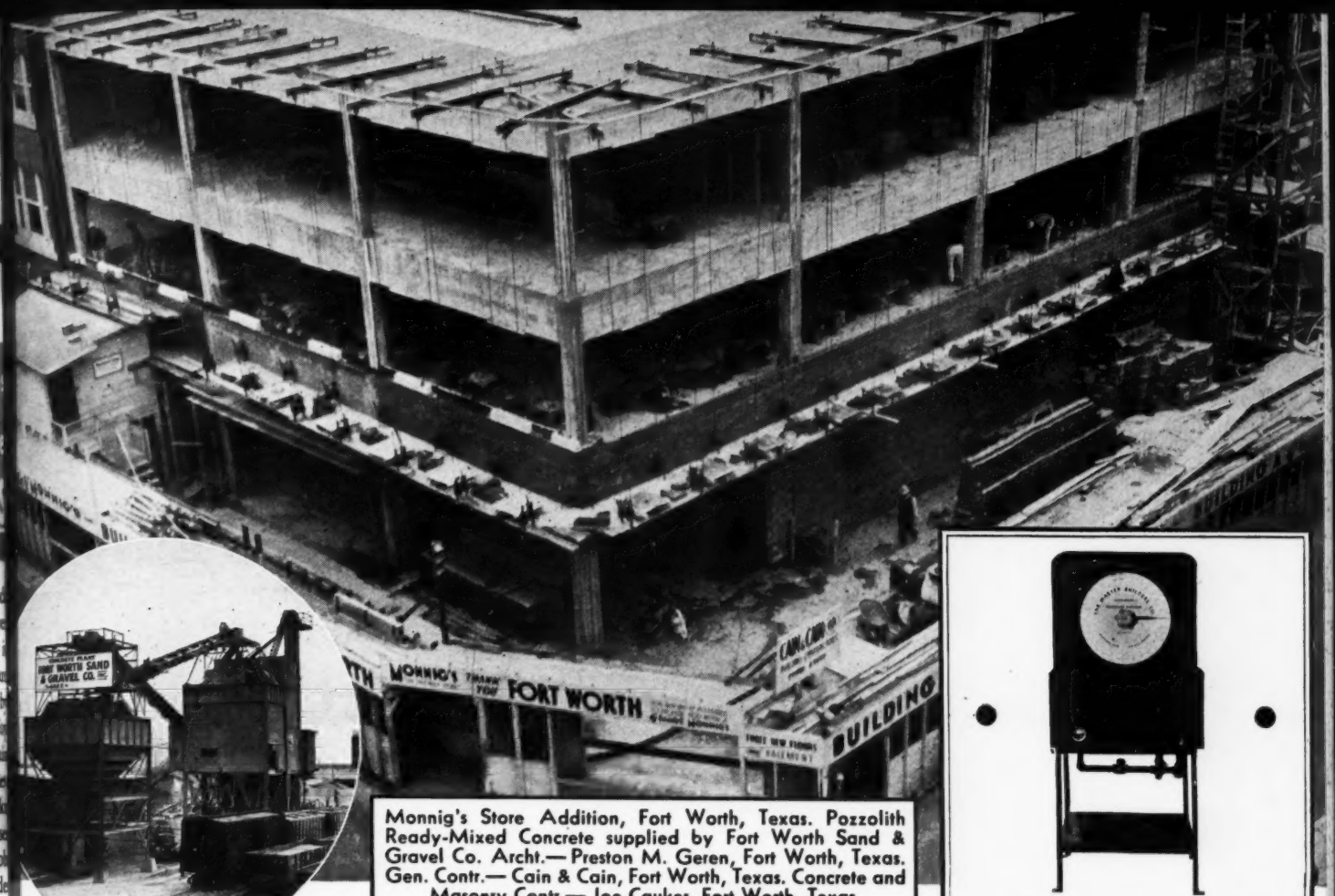
BESSER VIBRAPAC

CUSHIONED FOR GREATER PROTECTION

The mold on a Besser Super Vibrapac is cushioned on shock-absorbing rubber mounts and is free to vibrate in any direction. This same cushioning principle is used in engine mounting to prevent transmission of shocks and eliminate damage and noise.

THE SAVING IN PALLE... WILL PAY FOR A BESSER VIBRAPAC PLAIN PALLET STRIPPER

BESSER PLAIN PALLET VIBRAPACS



Monnig's Store Addition, Fort Worth, Texas. Pozzolith Ready-Mixed Concrete supplied by Fort Worth Sand & Gravel Co. Archt.— Preston M. Geren, Fort Worth, Texas. Gen. Contr.— Cain & Cain, Fort Worth, Texas. Concrete and Masonry Contr.— Joe Cauker, Fort Worth, Texas.

Better Concrete because it's

POZZOLITH READY MIXED CONCRETE

Ready-Mixed concrete for this job, produced with Pozzolith and the M. B. Automatic Dispenser, resulted in:

- Easy, Accurate Control
- Better Quality Concrete at
- No Extra Cost

Leading ready-mixed plants in all parts of the country are producing Pozzolith Concrete for the same reasons.

Write for complete information.

POZZOLITH AUTOMATIC DISPENSER

Delivers the correct amount of liquid Pozzolith by setting the dial and pushing the button.

OVER 150 READY-MIXED PLANTS HAVE BEEN EQUIPPED WITH THIS DEVICE WITHIN THE PAST 24 MONTHS . . .

WHY?

Because a producer can, at lower cost:

1. Produce waterproof concrete . . . with normal Portland cement.
2. Produce high-early strength concrete . . . with normal Portland cement.
3. Produce air entrained concrete without strength loss . . . with normal Portland cement.
4. Produce all of the above properties out of one cement bin . . . with normal Portland cement — stepping up production, reducing inconvenience in handling and cutting costs.

In normal mixes, concrete of any given durability, strength and workability, is produced more economically with Pozzolith than with any other material on the market, added at the mixer or inter-ground.

MASTER BUILDERS

CLEVELAND 3, OHIO — TORONTO, ONTARIO

Airplane view of plant and outside storage yard

PUMALITE — A Lightweight Block

Western Pumistone Products Co. uses processed pumice for concrete block aggregate

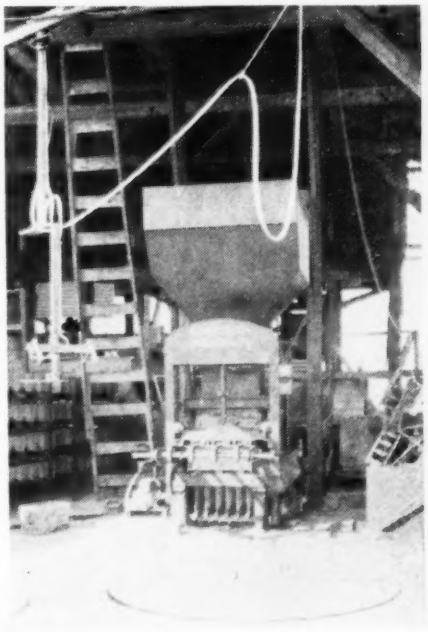
By WALTER B. LENHART

IN the South San Francisco Bay area are several new concrete masonry plants, but the largest and best equipped of the newer plants is the one built last year at San Carlos, Calif., owned and operated by the Western Pumistone Products Co. The company manufactures lightweight concrete building products of pumice aggregate marketed under the trade name of "Pumalite."

A No. 9 Stearns Joltcrete machine with a capacity of 4500 blocks (8- x 8- x 16-in. or equivalent) per 8 hours is used. The Stearns mixer and skip along with the block machine are all housed in an open-end, roomy structure. Steel pallets are used. A small Flam machine is also available.

Pumice secured from the Mt. Shasta section in Northern California is hard and strong, all passing 1-in. Transported to the plant in open gondola railroad cars, it is dumped to track hoppers and elevated to a small bin. From this bin, the pumice is delivered, via a short, horizontal belt conveyor, to a set of 16- x 26-in. Allis-Chalmers (Gates) double roll crushers set to deliver a minus ¼-in. product. The crushed pumice is elevated to storage bins over the Joltcrete. At present sacked portland cement is hauled from the Redwood City plant of the Pacific Portland Cement Co., but plans are afoot to install bulk cement handling equipment. Owing to the short haul (a maximum of about 20 miles) the cement costs to the company are low. Delays in other planned construction, such as steam curing kilns, etc., have been due to a serious labor shortage in the area.

Competition in the area is very keen with prices about 4 cents lower for the larger blocks than in the Pacific Northwest states. This condition is aggravated by the fact that the pumice freight rate from the Mt. Shasta area to San Francisco is 28¢ per cwt.



High production vibrating block machine

Pumice blocks here, like in other places on the Coast, have a firm hold on the imagination of the home owners, architects and builders. Their nailability, light weight, sound-proofing characteristics and other advantages have often been stressed. The conductivity of a pumice block, expressed in B.t.u.'s per square foot per deg. F. for 1-in. thickness as compared to other materials is quoted as follows:

Pumice Stone	1.62
Pumice Concrete	2.42
Ordinary Concrete	12.62
Brick Work	5.00

When operations were started, E. F. Judd, secretary and general manager of the company, used pumice exclusively and advertised its nailability and sawability. These earlier blocks easily met the 1000-lb. specification. Later it was found that by the addition of 15 per cent sand, the strength of the block increased from 1350 to 1500 lbs., and at the same time gave a much nicer looking block with no great sacrifice in weight or insulation values. The sand lowered the block's nailability somewhat.

After stripping, the block are placed on steel racks which rest on circular turntables built at floor level and just in front of the Joltcrete machine. These turntables facilitate the handling of loaded or empty racks as the entire assembly can be easily

(Continued on page 159)

Panoramic view of concrete block and floor and roof slab plant. To the left is the welding shop and Flexicore department with storage yard to the

Design Highly Mechanized Plant To Make A Variety of Products

Anchor Concrete Products Co., Buffalo, N. Y., has modern high temperature curing system, traveling weigh batchers, and rapid handling of materials and finished products

By BROR NORDBERG

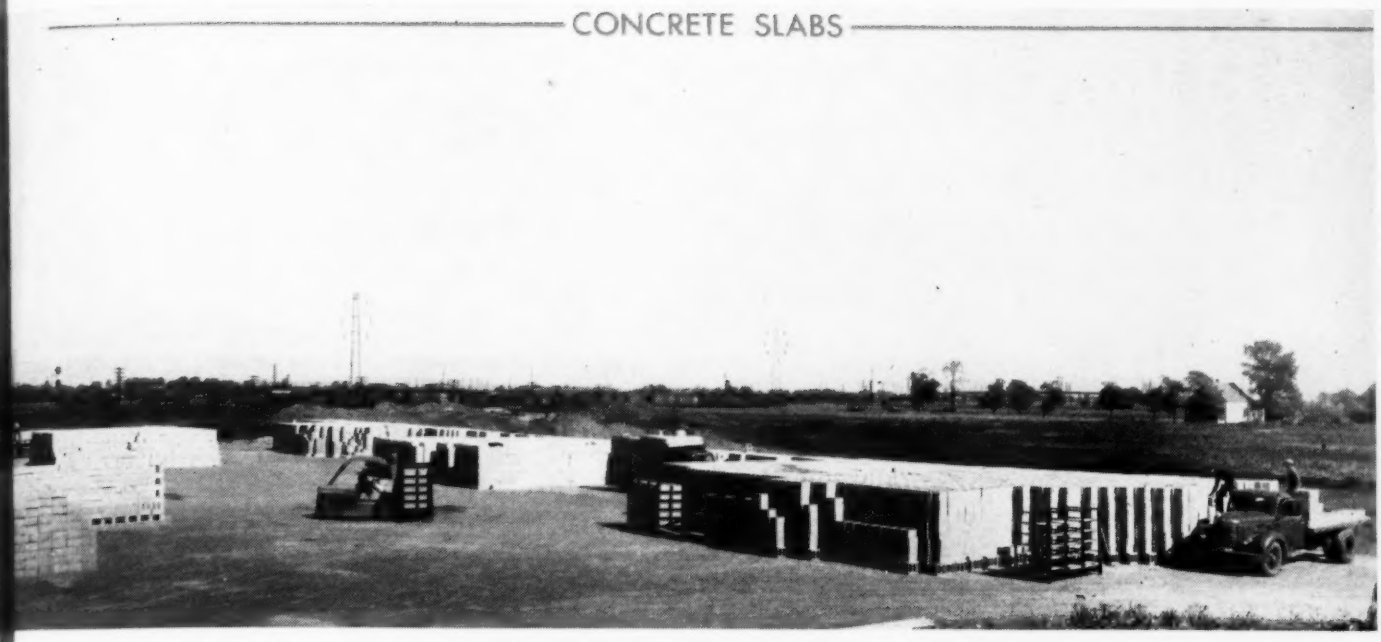
ONE OF THE LARGEST and most highly mechanized postwar concrete masonry plants to go into full production this year is the plant built by Anchor Concrete Products, Inc., Fred W. Reinhold, president, at Cheektowago, five miles east of downtown Buffalo, N. Y. The plant has a rated capacity of 2100 standard 8- x 8- x 16-in. concrete masonry units per hour, of either Celocrete, cinder or sand and gravel aggregates, and is one of the very few manufacturing plants in which the basic design has provided for other concrete products —Flexicore floor and roof slabs, I-beam precast joists, lintels, sills, chimney block and concrete brick.

This is one plant that is spacious and has room for unlimited expansion. Located on nine acres of land, there is 25,000 sq. ft. of concrete floor manufacturing area under a single roof, including 9700 sq. ft. for flexicore manufacture, the curing kilns, dressing room and toilet facilities for the workers, and machine shop. The structure is unique, of concrete frame construction throughout, with a 45-ft. clear span rigid concrete frame over the main manufacturing area.

Showing ample capacity, high ceiling curing room

All phases of plant operation are according to practices now commonly accepted by the concrete masonry industry as most economical and efficient for large capacity. Aggregate bin capacity has been designed for flexibility in the simultaneous manufacture of concrete masonry units from several aggregates, with bulk cement and a travelling weigh batcher serving three mixers which, individually, serve three Besser Vibrapacs on the floor below. Curing is done by high temperature steam followed by a drying cycle; and power lift trucks eliminate manual handling at the machines, in the kilns, for yarding and in the loading of cubed units onto trucks in the yard.

From the standpoint of efficiency the plant is much more effective in labor utilization than the old plant it supplanted, the output in concrete masonry units having been increased by 25 per cent per man-day exclusive of savings by cubing, which practice has



extreme left. To the right is the block manufacturing department with yard storage to the right. Aggregate conveyor may be seen above bins

only recently started. Cubing, according to those with long experience in the practice, is the one single operation in which greatest manpower conservation has been derived. Technological improvements such as have been incorporated into a plant like this explain why a company has been able to pay labor 200 per cent higher wages since 1933 (N.R.A. days) and still raise the price of its product only 13 per cent.

Aggregates-Cement-Batching

Aggregates, either cinders, Celocrete or sand and gravel, are elevated into the main plant bins by 24-in. Barber-Greene belt conveyors on 276-ft. centers, total, and with a vertical lift of 75 ft. Belt conveyors were preferred to other methods of material handling, based on previous experience with maintenance. Adjoining hoppers over the tail pulley permit receiving aggregates either by rail or truck, which are unloaded at the rate of 100 cu. yd. per hour. Rather than having a single belt, there is a transfer tower at a location adjoining the plant where a new cinder processing plant is to be erected in the near future, cinders at present being processed at the old plant which soon will be scrapped.

Portland cement is received in 60-bbl. capacity trucks which are unloaded in 15 minutes into a conventional screw conveyor, enclosed bucket elevator arrangement to a compartment of the overhead bin. Butler Bin Co. engineered the entire aggregates and cement storage and batching plant and furnished the bins and electrically-propelled travelling weigh batcher. A single bin of six compartments, three of 75 cu. yd. capacity each and three of 26 cu. yd. capacity, provide the flexibility for simultaneous manufacture of two types of concrete masonry units. The travelling weigh lorry charges each of three 50-cu. ft. Besser mixers, each directly over a block machine, while a manually-propelled weigh batcher is operated on the same rails to charge a 40-cu. ft. mixer which serves the flexicore manufacturing plant adjoining below.

Aggregates are separated sizes, ½-in. top size for coarse and ¼-in. minus fines, and air-entraining cement is prefered to standard portland cement. According to Mr. Reinhold, air-entrained concrete has greater plasticity, of particular importance with the harsher aggregates, and by its use absorption is reduced and compressive strength increased slightly in the finished product.

Masonry Manufacture

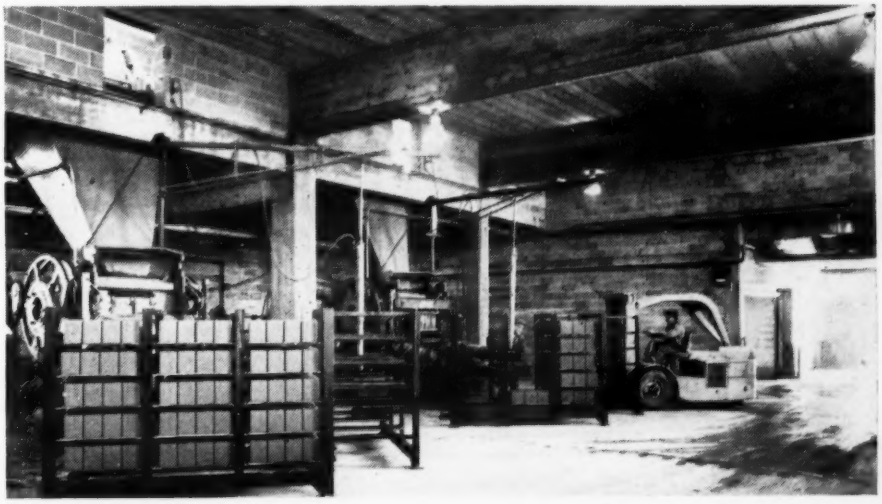
Capacity of the Vibrapac block machines has been stepped up to 700 units per hour each and a 108 unit curing rack has been adopted as standard, with a gasoline-powered Hyster lift truck to charge the curing kilns and to return empty racks to the machines. Units are placed on the racks by pneumatic off-bearer. The same type of power lift truck is used to yard the units from the kilns and a third loads cubed units (4-ft. cubes) on to trucks for delivery.

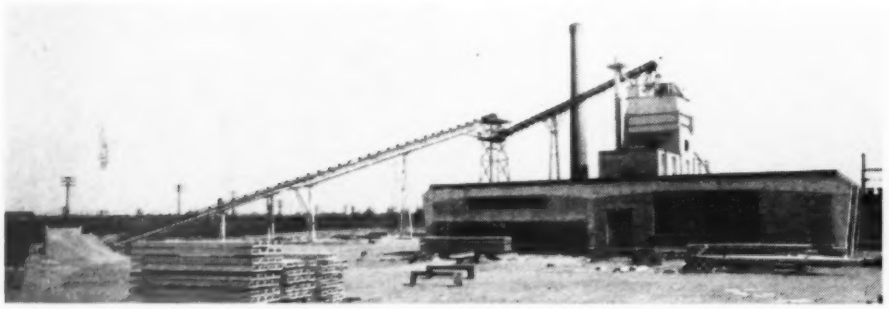
Curing

The curing kilns are unusually large, and were built and insulated for maximum conservation of heat during the high temperature steam curing cycle. There are only four but of 4000 unit capacity each, measuring 18 ft. wide, 69 ft. in length and 8 ft. in height. Holding 38 racks, each kiln is fully charged in two hours, about the same loading time required for filling smaller kilns in single machine plants. An advantage claimed for large curing rooms is that there are fewer walls through which heat may be conducted and, of course, there is plenty of space for maneuvering the power lift trucks.

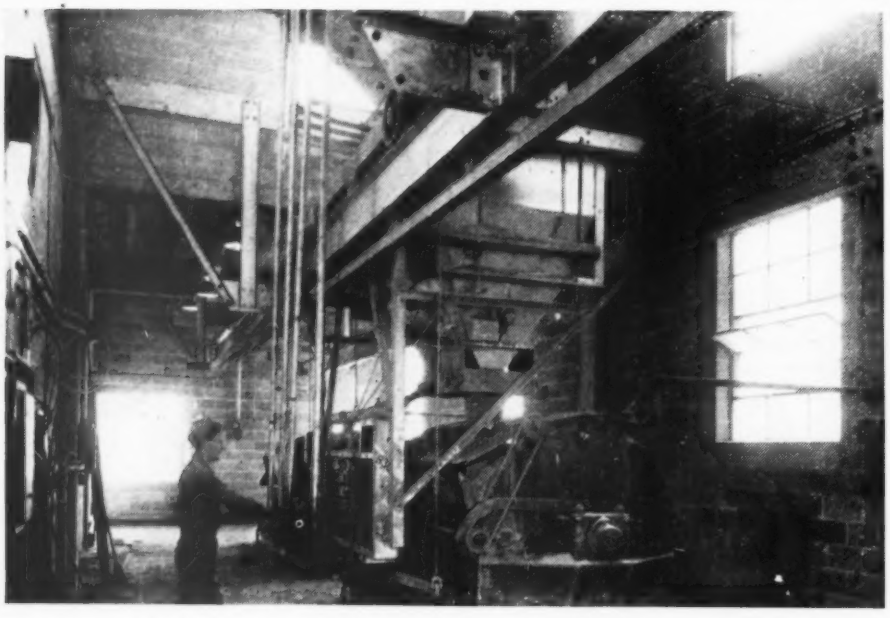
Open at one end and constructed in pairs, one on either side of the con-

Concrete block machine production line. Note mixer floor above, and lift truck taking away rack loaded with block to curing room

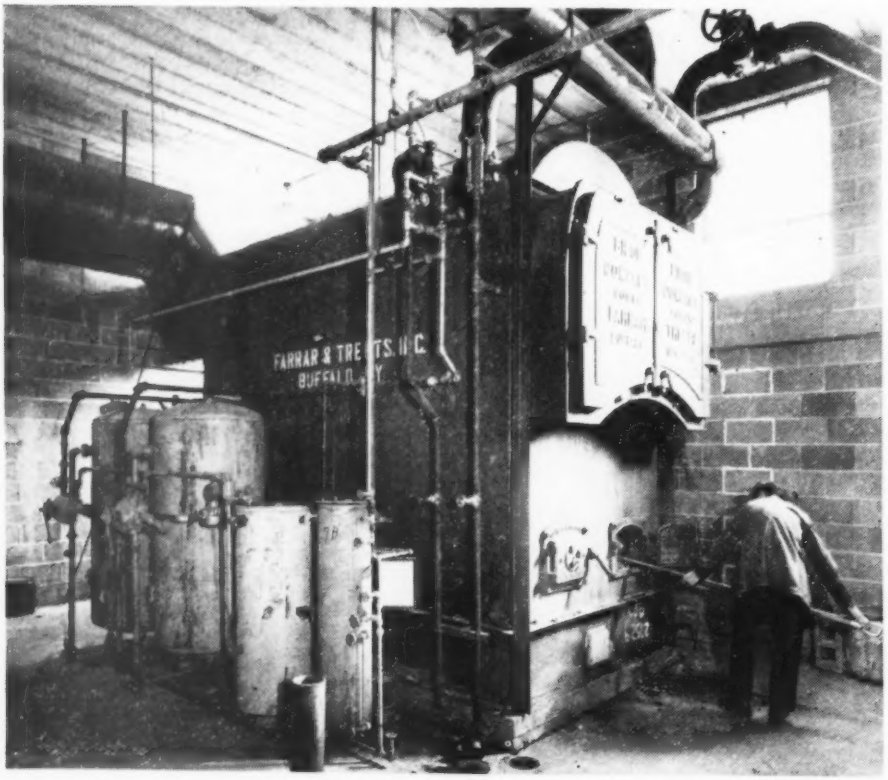




Flexicore yard storage with plant in background. In the background may be seen long conveyor for conveying aggregates from hoppers below rail track level and also a truck dump pit



Operator at the controls of traveling weigh lorry over concrete mixer



Large capacity boiler to supply steam for curing

crete runway to the yard, the curing rooms are of cavity wall construction, 4-in. and 6-in. Celocrete concrete units with 2 in. of foamglas insulation between forming the outside walls. The partition walls are of 8-in. Celocrete units. The roof is of flexicore roof slabs topped with 2 in. of foamglas insulation and 4-ply roofing material. Positive seal Keneer overhead doors complete an installation of curing rooms that very effectively contributes toward maximum fuel conservation. Under average conditions it is said that there is a temperature drop within the rooms not exceeding 10 deg. F. from the maximum temperature of 180 deg. F. after steaming has stopped.

Temperatures are recorded continuously by Foxboro and Powers instruments and steaming is followed by a drying cycle designed to remove moisture contained in excess of 40 per cent of total absorption as specified by principal standards for concrete masonry units. Individual Buffalo blowers of 2000 c.f.m. capacity, in combination with Modine hot flash steam coil unit heaters, force air heated to 180 deg. F. into the curing rooms for drying the concrete units. A 178-hp. tubular-type, low-pressure, coal-fired steam boiler of 15 p.s.i. maximum pressure develops the steam for curing and for drying. Live steam is introduced for curing through three 2-in. outlets located at the ceiling halfway down a kiln and to one side. Heated air is forced into the kilns through four overhead ports equally spaced inside the kiln.

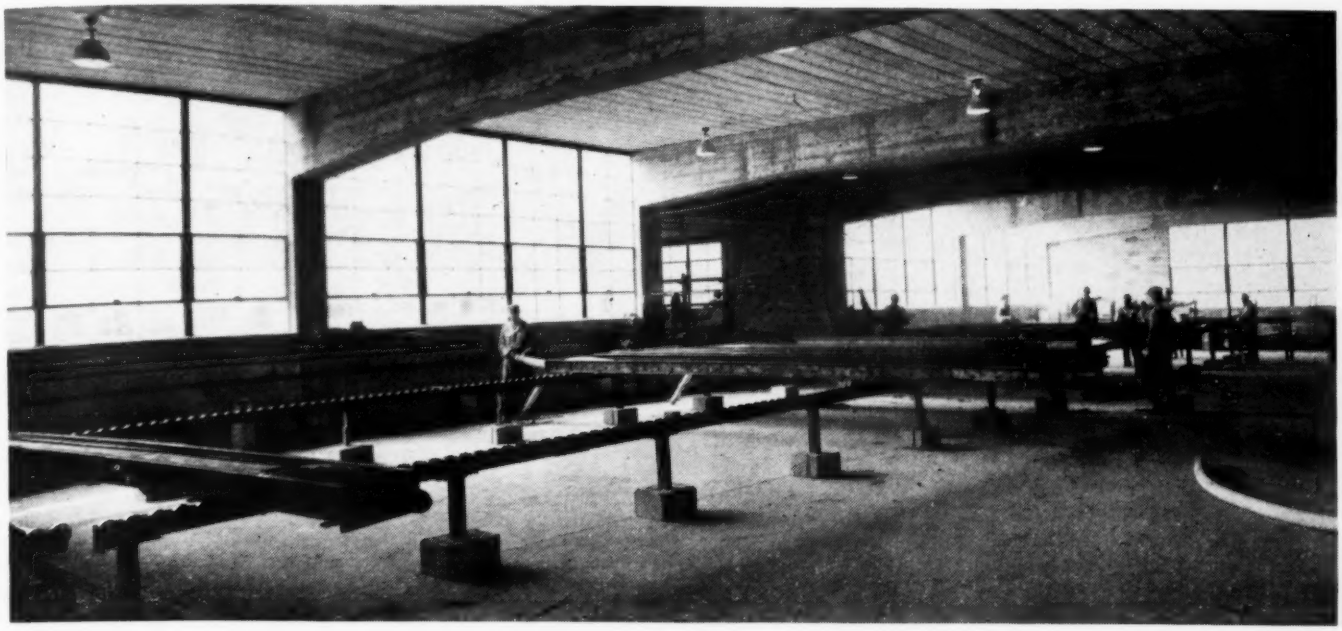
The curing-drying cycle, designed to meet contained moisture limitations and compressive strengths of 1000 p.s.i. for grade A units (A.S.T.M. designation) is subject to change, as most are in the industry, Anchor being one of the concerns most active in industry-wide research for the development of an optimum cycle.

At present, 180 deg. F. is considered the most suitable steaming temperature for creating optimum relative humidity. The total cycle consists of 13 hr. for curing followed by a 11-hr. drying period at 180 deg. F.

A kiln is charged in two hours, the door is closed and steam permitted to enter for an hour in the attainment of a temperature of 110 deg. F. Steam is then injected to attain a temperature of 180 deg. F. for an 8-hr. period including 2 hr. required to reach that elevation. A 2-hr. soaking period follows the shut off of the steam and the kiln is vented during the 11-hr. drying cycle that follows, the vents automatically opening when the hot air blower starts. Units taken from the curing rooms may be cubed either inside or outside the plant and are ready for immediate delivery.

Flexicore Manufacture

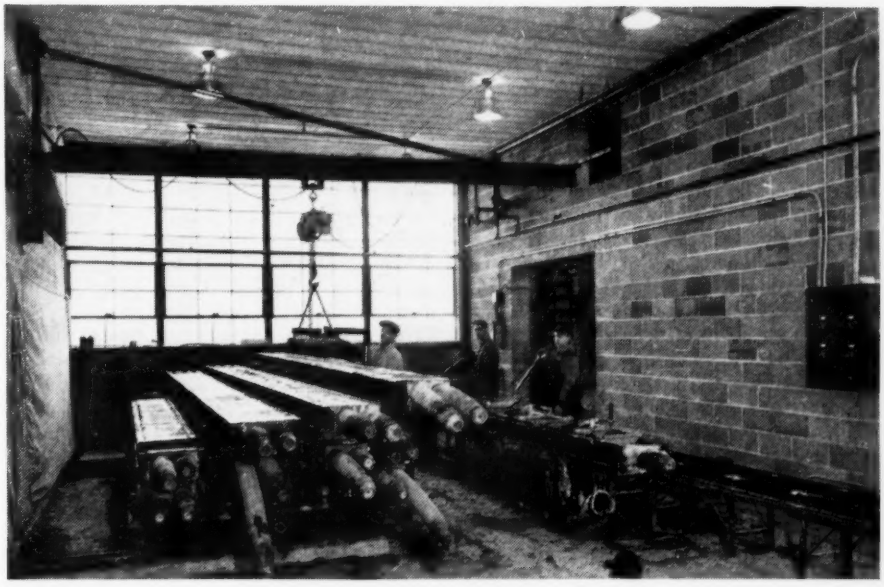
Anchor Concrete Products had been manufacturing flexicore precast con-



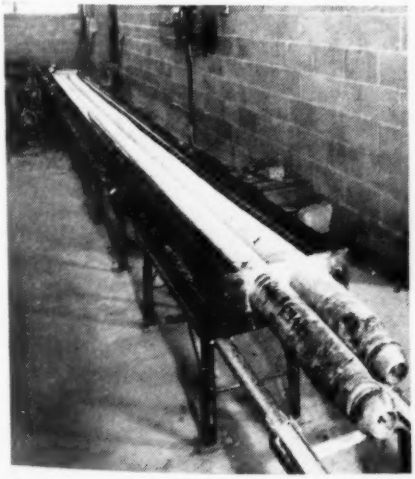
Overall view of Flexicore production line set-up with roller conveyors

Steps in Flexicore Manufacture

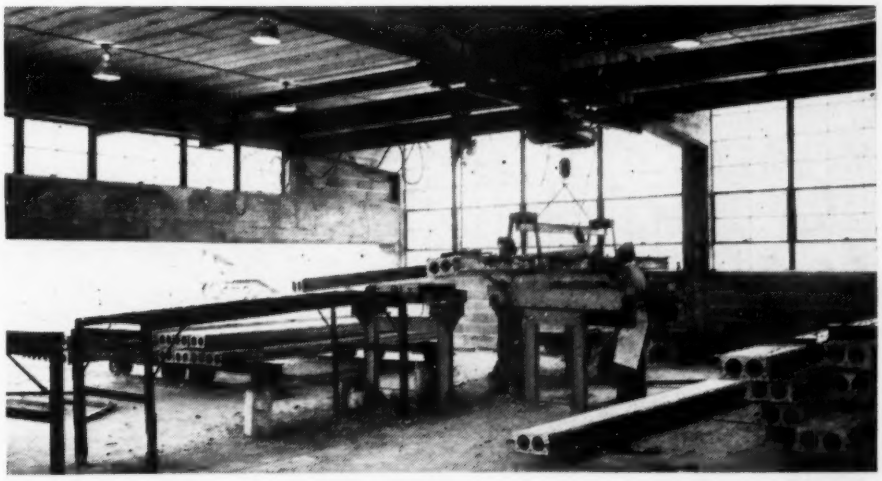
Prestressing reinforcing steel in floor slab



Poured concrete slabs, to the left, going into the curing room. Note vibrating table, to the right



Pneumatic tubes inflated in form ready for concrete pouring



Showing convenient method of handling Flexicore slabs after stripping from forms

Left to right: Richard T. Carpenter, vice-president and chief engineer; Grant N. Reinhold, vice-president and assistant superintendent; Harvey A. Lee, secretary; Wm. L. Schiesel, treasurer; Frederick W. Reinhold, president; and Wm. J. Dugan, chairman of the board of directors

Official family. Left to right: John Buchbinder, Harold I. Sinclair, Howard B. Barth, Grant N. Reinhold, Howard O. Crooker, Wm. L. Schiesel, Frederick W. Reinhold, Richard T. Carpenter, Raymond R. Reinhold, Roy A. Powell, Wm. J. Dugan, and Harvey A. Lee

crete floor and roof slabs since 1940 at another location, under a license covering 12 counties in western New York State, and has enlarged its manufacturing facilities for this product in the new plant. Flexicore units are manufactured to spans of 16 ft. 6 in. and 22 ft. 6 in. by straight-line methods employing roller conveyors, wheel-mounted trucks and overhead chain hoists as shown in the accompanying photographs. They measure 6- x 12-in. in section, with two 4⅝-in. circular cores formed by the inflated and deflatable rubber tubing, and are reinforced with prestressed steel.

Molds, which consist of a pan and two channel side rails are cleaned, pinned and oiled on the gravity roller conveyor at one end of the building. Reinforcing steel is then placed and prestressed as shown in one of the illustrations. A transfer is made at the end of the flexicore plant to a wheel-mounted transfer car, the rubber tubing is placed and inflated, and the truck is pushed to a point below the overhead concrete mixer from which concrete has been discharged into a steel hopper. The mold is placed on a table equipped with three vibrators, the concrete is placed, vibrated and screeded. Twenty molds are piled on a loading truck, on 14-ft. centers rails, which is pulled into a steam curing kiln by cable.

Curing is done overnight but the steam is shut off after a 4-hr. period to deflate and remove the rubber tubing which is thus made available for two pours. After curing, the molds are removed on a stripping table and placed on a cross roller conveyor for return to the assembly conveyor. Flexicore units are cubed in lots of eight and are stockpiled and loaded by a Ross power lift truck.

Natural aggregates, sand and gravel, are used for flexicore manufacture and the concrete has a slump of 1- to 2-in. The use of air-entraining cement plus the addition of the equivalent of 2 lb. of calcium chloride to a sack of cement enables a speed-up in stripping the molds, early handling of wet units with little cracking and, due to greater plasticity, better placeability.

Lift truck taking load of floor slabs from rail mounted dollies for yard storage

Future Plans

Future plans provide for the new cinder crushing plant previously mentioned, a sample kiln for research on curing and a laboratory for quality control. A new office building is now in process of completion.

Fred Reinhold, a past president of the National Concrete Masonry Association, has been identified with the concrete masonry industry for 27 years and founded Anchor Concrete Products, Inc., in 1936. The new plant takes the place of his original concrete masonry manufacturing plant and a separate flexicore plant, which by the way were the source of supply for all the precast concrete roof slabs in the new plant and the masonry units for wall construction.

Ground was broken for the new plant October 5, 1945. The first machine was started in August, 1946, the second went into production in September, 1946, and the third has recently gone into service.

Specialists were employed to engineer and build the plant. G. Morton Wolfe was architect; Shirley-Heiman Co., Inc., did the general contracting; and James F. Gill, concrete structural engineer, designed the rigid frame plant structure.

Merchandising

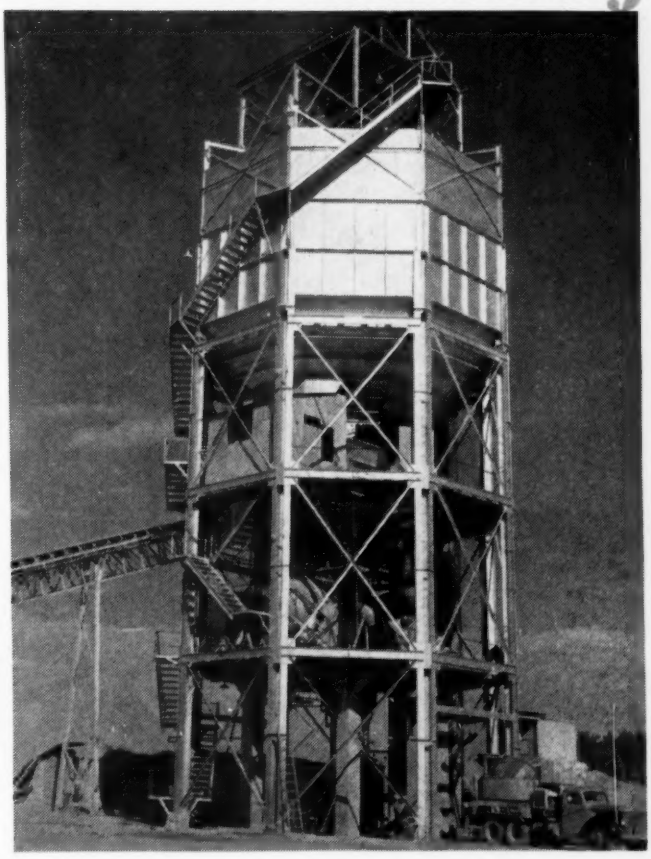
Anchor Concrete Products is an aggressive merchandising concern and has pioneered concrete home construction and the use of concrete joists and slabs in the Buffalo area. In recent years, the farm market has been aggressively promoted through rural community dealers in nine counties, some 130 of them, who are supplied with literature, sales helps of every sort and advertising at the local level.

Officers of the company are Fred W. Reinhold, president; W. J. Dugan, chairman of the board of directors; Richard T. Carpenter, vice-president and chief engineer; Grant N. Reinhold, vice-president and assistant superintendent; Harvey A. Lee, secretary; William L. Schiesel, treasurer. Raymond R. Reinhold is superintendent of the plant.

Automatically Controlled Ready-Mix Plant

Arizona Sand and Rock Co., Phoenix, Ariz., ready mixed concrete plant has eight steel bins with a capacity of 2000 tons of sand and gravel and two cement storage tanks, each holding three carloads

By WALTER B. LENHART



Concrete and steel ready mixed concrete batching plant. Note two mixers in tandem

WITHIN the past six months, the Arizona Sand and Rock Co., Pheonix, Ariz., has placed in operation a new concrete-steel ready mixed concrete plant that ranks among the best for neatness, rugged construction, capacity, and over-all efficiency. The tall steel structure of exceptionally heavy design has been sprayed with aluminum paint and dominates the surrounding landscape. This company is well-established as a ready mixed concrete producer, and its fleet of 16 mixer trucks has advertised the company throughout the city.

Storage capacity in the new plant above the Johnson batcher equipment provides for 2000 tons of sand and gravel. There are eight steel bins in all for sand and gravel, but at the time of inspection six sizes of sand and aggregate were being stored. In addition there are two cement storage tanks each capable of holding about three carloads of bulk cement. Ordinarily there is stored in the hard aggregate bins ⅜-in., ½-in., 1-in., and 1½-in. materials along with two grades of sand, but occasionally for special mixes ½ in. gravel is stored as well as coarser sizes. The Johnson batcher has been modified somewhat, the main change being the installation of a large single weighing hopper instead of the individual weighing hoppers supplied with the original equipment. Bulk cement, coming into Phoenix by rail, is stored near the railroad tracks in silos, holding three carloads. From these silos the cement is delivered to the new plant at South 7th Street and Salt River by dump trucks where it is unloaded to a truck hopper and elevated by bucket elevator to one of two storage bins.

Unusual Tunnel Conveyor

Sand and gravel are delivered to the ready mixed concrete plant by a series of 36-in. belt conveyors that operate under the company's commercial aggregate piles across the street from the ready mixed concrete plant. This tunnel is of very unique design. In the first place, it is of exceptionally massive concrete construction, heavily reinforced. The tunnel is 16-ft. wide, and has 12-ft. clearance so that large capacity trucks can drive down under the stockpile and load from air-operated gates. On one side of the tunnel runs the 36-in. belt conveyor serving the ready mixed concrete plant. There are 12 air-electric gates, only four of which are at present used for the ready mixed concrete aggregates. The other gates are for truck loading. The belt conveyor supports rest on the concrete tunnel floor with the air-gate passing the aggregate through steel hoppers to the belt below as seen in the illustration. Gates for the belt conveyor system are controlled from the batching operator's station, and are so designed that green or red lights on the switchboard show the operator if the gate is open or closed. Through the air-electric mechanism the gate cannot be left half open. The belt conveyor carries the aggregate under the street at which point the belt starts to increase its grade to around 20 deg. This belt discharges to a second but shorter belt conveyor that continues to elevate the material for delivery to the swivelled chute serving the eight storage bins. The tunnel sides are of 18-in. concrete with a 24-in. slab above. The ramp going into the tunnel is curved slightly and quite steep; the outlet to the tunnel is a flatter gradiant but is also curved at the

One of the newest ready mixed concrete trucks

(Continued on page 159)

DESIGN of Concrete Mixes

Part 6: Scientific Control in the Concrete Manufacturing Plant

By R. E. ROBB*

IN THE PREVIOUS ARTICLES of this series the various fundamentals of scientific control of concrete manufacture have been discussed in some detail, and some of the more dangerous hidden leaks, which sap profits were pointed out. This article will show how control can be installed in practically any concrete plant.

Two prime requisites for concrete control are adequate weighing equipment for the aggregates and the will to apply scientific principles to every day operations. While elaborate special equipment is desirable, and is of decided advantage where conditions warrant its use, it most emphatically is not essential in securing precise control. Some additional small equipment will be required, but this can be secured on the open market at the cost of a few dollars.

It is essential that aggregates be weighed for three reasons—bulking of sand due to moisture; compensation for surface moisture; ease of changing proportions. Bulking, which varies with the per cent of surface moisture carried by the sand, makes it impossible to secure the same amount of sand from batch to batch by volumetric measurement. The only practical method of compensating for surface moisture is on a percentage basis by weight. The per cent of moisture carried by the various aggregates is determined, the weight of the aggregate weighed into the batch is increased by this amount, and the amount of mixing water added is correspondingly reduced. Ease of changing proportions is essential in the ready mixed concrete plant. Often it is necessary to change from batch to batch when several jobs are being serviced. It is impossible to do this rapidly with any type of volumetric batching apparatus. For all of the above reasons, weighing equipment for the aggregates is considered essential.

Cement may, under some circumstances, be handled by the bag, and the batch designed on a bag basis. This is not too serious in the contractor's or concrete products plant where exact yardage yield is not essential. In the ready mixed concrete plant, however, where each batch should be exactly one cubic yard or a multiple of a yard, it is usually necessary to use a fraction of a bag. Hence in this type of installation the cement too must be weighed.

Water, being a liquid, can be measured with approximately the same degree of accuracy as it can be weighed — sufficiently accurate under most conditions for concrete batching. However, a serious difficulty presents itself in regard to compensation for moisture in the aggregate. This can be reduced from weight to volume and the deduction made. In general, however, it will be found decidedly advantageous to weigh the water as well as the other ingredients.

The following is a list of the principal items of special equipment used in scientific control:

Essential — apparatus for preparing saturated, surface dry (SSD) samples of aggregate; apparatus for determining specific gravity and percentage of surface moisture in aggregate; equipment for batch weighing ingredients; standard measures, mixing pans, tamping rods, platform scale; cylinder molds and the use of a testing machine or laboratory for testing specimens; set of standard sieves and apparatus for drying aggregate.

Very desirable but not absolutely essential—power sieve shaker; accelerated strength apparatus; shot capping apparatus; curing cabinet and dipping tank; testing machine; automatic compensating and recording weighing equipment.

Less effort is required on the part of the operator when the more elaborate equipment is used, and the automatic compensation and recording apparatus removes a certain amount of the human element and supplies a permanent record of what actually went into each batch. But while these refinements are very desirable and their use is entirely warranted under many conditions, yet they are not essential in securing accurate control, and the added expense may not be warranted in the small capacity plant.

Essential Special Equipment

Apparatus for preparation of saturated surface dry samples of aggregate was described in detail in the first article of this series entitled "Specific Gravity—The Key to Scientific Concrete." It consists of a square, hexagonal or octagonal box rotated by a motor and lined with absorbent material. A sample of damp aggregate is placed in the box, which is sealed air tight and rotated until all surface moisture has been "wiped" off the surface of the aggregate particles, either coarse aggregate or sand. When the coarse aggregate appears dry, and when the sand flows freely, all surface moisture has been removed. But, because wiped dry in a saturated atmosphere, no water has been removed from the pores of the aggregate. This is the basic condition for determination of the specific gravity of the aggregate.

*Consulting Engineer.

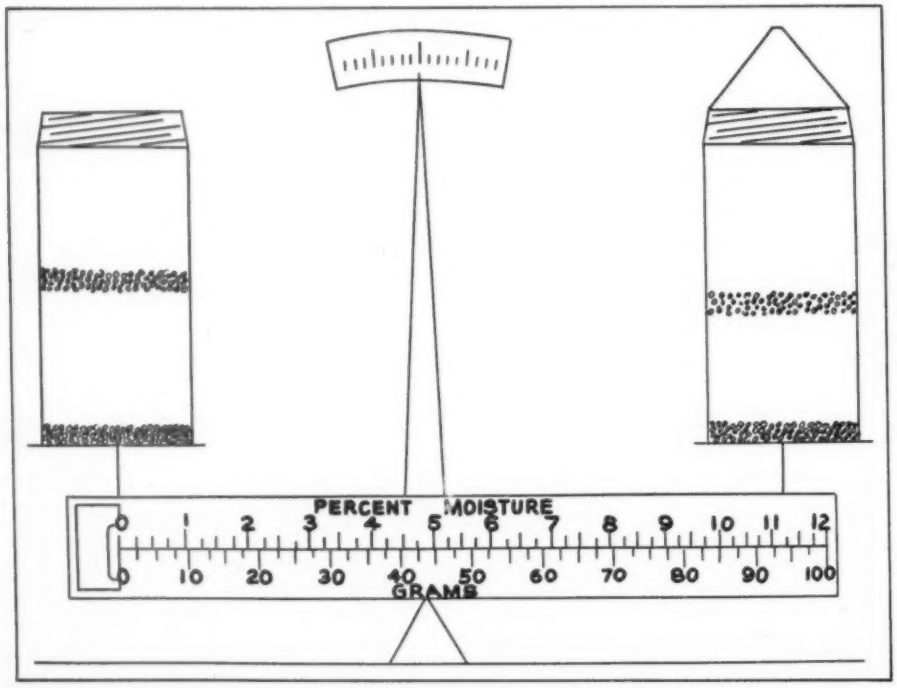


Fig. 1: Pycnometer moisture meter

Specific Gravity — The equipment and operations necessary for determining the specific gravity of aggregates were also described in detail in the first article. For specific gravity, the only equipment necessary is a laboratory type scale of 5000 grams or more capacity, and a pycnometer. (See Fig. 1) The same apparatus can be used for determining surface moisture in the aggregate. Since full instructions for determination of specific gravity were given in the above mentioned article, they will not be repeated here. However, the very great importance of correct determination of this vital factor is again stressed. *Scientific control is impossible if specific gravity determinations are incorrect.*

Moisture Meter—The same apparatus is used for determination of surface moisture as for specific gravity except that a conversion scale is used from which per cent moisture is read direct. Fig. 1 shows typical apparatus for this work. The pycnometer is a 2-quart mason jar with a cone about 2 in. high, having a hole about ¼-in. diameter in the apex, soldered into the screw cap. If this pycnometer has the cap always screwed on to the same point, as shown by a vertical mark on both cap and bottle, and is filled completely full of water, the total volume in the pycnometer will be the same each time, within limits amply close for all concrete laboratory determinations. Variations in temperature of the water will, however, affect the volume in the pycnometer.

The scale is the ordinary two platform laboratory balance, preferably with a bar graduated in half or tenth grams and an adjustable weight on this bar for balancing.

This moisture meter is based on the principle that equal weights of saturated surface dry and of damp aggregates of the same specific gravity, weighed in air, will have different weights and will occupy different volumes when weighed under water. The moisture meter is adjusted for each aggregate by placing the standard weight of saturated, surface dry aggregate in the pycnometer, filling with water, agitating to eliminate all air, and balancing with the counterweight. If the standard weight of damp aggregate of the same specific gravity is placed in the pycnometer and it is filled with water, it will be found that the full pycnometer will weigh less than when saturated, surface dry aggregate was used. This difference in weight is converted into per cent moisture by a special scale mounted on the beam.

A convenient counterweight is made by putting enough of the aggregate being tested into another 2-quart mason jar and sealing tightly. Then each time an aggregate is being tested for moisture, the proper counterweight is used almost automatically. If sealed tightly there will be no change in weight due to drying or absorption.

Moisture determinations accurate to 1/10 per cent can be made with this moisture meter in approximately 1 minute, and without any computations whatsoever. The following steps should be taken for accuracy and speed:

1. Weigh out in funnel mouthed scoop the standard weight of damp aggregate. (For convenience it is well to have a counterweight weighing exactly the standard weight plus the weight of the scoop).
2. Pour sample of aggregate into pycnometer about half full of water. (It is important to pour the sample through the water. This eliminates the possibility of entraining air, which takes place if water is poured on the sample.
3. Fill lower part of pycnometer with water and overflow to wash out emiscus. (This can be done quickly by immersing the whole jar, without the cap, in a large vessel of water).
4. Screw cap on to proper point.
5. Fill cap through hole in apex by holding under tap or using ear syringe. Overflow till all remaining emiscus has been washed out. (If removal of emiscus has been done thoroughly under (3) there will be very little to come out through the cap).
6. Wipe outside of pycnometer to remove adhering water.
7. Set on platform with proper counterweight on other platform, and balance with slide.
8. Read per cent moisture under slide.

This moisture meter has been thoroughly tested under job conditions. It is the most accurate moisture meter of which the writer has knowledge, is almost fool proof in use, and is as rapid as any. With this moisture meter, determinations can be made amply fast to insure that every batch of concrete has had the proper compensation for surface moisture in all aggregates used.

Batch Weighing Equipment

Accurate control of total mixing water in each batch is essential for control of concrete proportioning. The moisture meter described above gives an accurate and almost instantaneous method of determining the per cent moisture, on a saturated, surface dry basis, carried by each aggregate entering the mix. This percentage must then be reflected in the batch weights of the various ingredients.

Suppose 2000 lbs. of saturated, surface dry sand is required for the batch, and the moisture meter shows a moisture content of 6 per cent. The weight of damp sand to be weighed into the batch then is .06 × 2000 = 120 plus 2000 equals 2120 lbs. Similarly, if the weight of coarse aggregate required is 4000 pounds, and the moisture content is 2 per cent, the

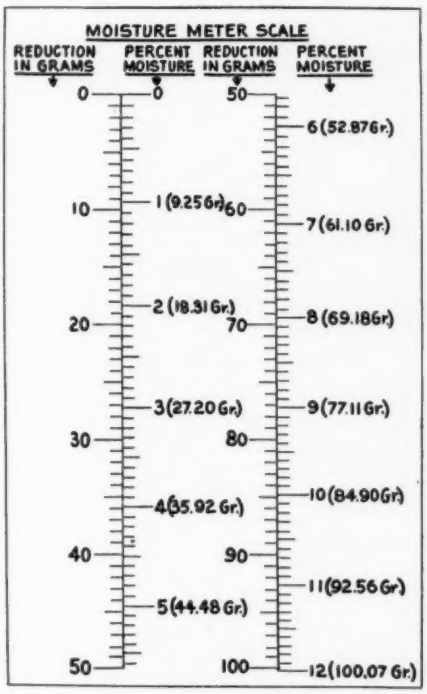


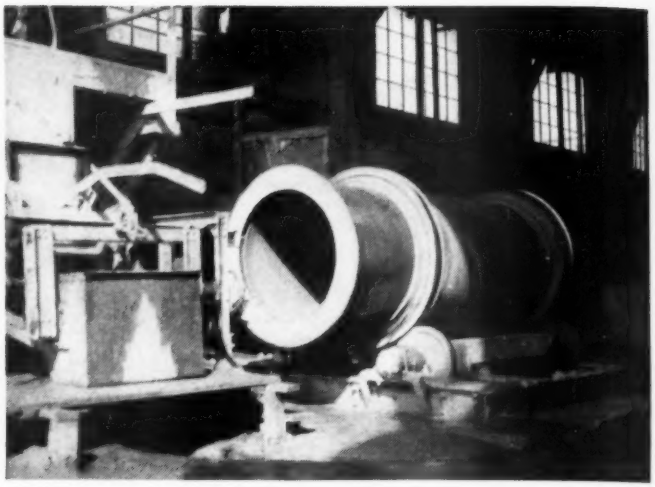
Fig. 2: Chart for converting reduction in weight, in grams, into per cent surface moisture carried by aggregate

weight of coarse aggregate for the batch will be 4080 lbs. Thus 200 lbs. of water will go into the batch with the aggregate, and this much must be deducted from the added mixing water. If the water is measured by volume, it will be well to convert the scale from gallons into pounds for ease in making corrections. In the contractor's and concrete products plants the changes in batch proportions will be relatively few, and these computations and corrections can easily be taken care of individually. In the ready mixed concrete plant, however, where the mix proportions are constantly changing, as many as possible of these computations should be performed in advance and reduced to table form for convenience and accuracy.

Automatic weighing and compensating equipment is of especial value in the ready mixed concrete plant. Elaborate special equipment is manufactured which gives automatic compensation and a complete record of all batch weights, showing amount of compensation for moisture in each aggregate. Many plants, however, have their own perfectly good weighing equipment. This can readily be converted to give automatic compensation for moisture.

For converting reduction in weight, in grams, into per cent surface moisture carried by the aggregate, Fig. 2 is used. The scale in Fig. 2 is designed for a Sp. G. of 2.65. On account of the slight changes in values for small variations in Sp. G. this is entirely suitable for any Sp. Gs. between 2.60 and 2.70.

(Continued on page 160)



Left: Fitting chuck or spinning ring onto reinforcement assembly. Right: Pipe being lined with concrete by centrifugal process

Design and Test Requirements

For CONCRETE PIPE

By M. W. LOVING*

AN ARTICLE about the Hunziker centrifugal process for making reinforced concrete pipe in England, Switzerland and South Africa, (ROCK PRODUCTS, December, 1946, p. 141, M. W. Loving) prompted a very interesting letter from F. L. Fitzpatrick, general manager, Rocla Limited, Melbourne, Australia. The author recently received very informative letters from J. A. Cussen, general manager and C. C. Halkyard, chief engineer, Hume Pipe Co., (Australia) Limited, Melbourne, Australia. Most of the outstanding developments in centrifugal concrete pipe manufacture and precision methods of making and placing steel reinforcement assemblies originated in Australia. The EDITOR of ROCK PRODUCTS asked me to comment on Mr. Fitzpatrick's letter; also review and compare the foreign specifications with those in the United States and Canada.

Here is Mr. Fitzpatrick's letter of March 7, 1947:

"In ROCK PRODUCTS, December, 1946, (page 143), you discuss pipemaking practice in U.S.A. and elsewhere and mention that external loading tests are not required outside U. S. and Canada — hence the thin shells.

"This is not so—as far as Australia is concerned. We use thinner standard shells than you set out for the Hunziker process, but we do have to comply with 3-point test loads. (See Australian Standard Specification, No. 35/1936.) All authorities here require these tests.

"The practice is to follow the methods generally developed by Engineering Experiment Station, Ames, (Iowa), in calculating loads on pipes under fill.

"The standard (Class X) pipe here is as per table below. For higher fills, we design the pipes specially, with thicker shell and more reinforcement.

Diameter	Shell	Class X 3-point test load lbs.—lin. ft. (without visible crack)	Safe fill over crown embankment conditions (1st Class bedding 0.70 projection)
6	7/8"	850 lbs.	
9	1"	900 lbs.	
12	1 1/8"	1000 lbs.	
18	1 1/2"	1350 lbs.	
24	1 3/4"	1700 lbs.	
30	2"	2150 lbs.	
36	2 1/4"	2500 lbs.	8'0"
42	2 1/2"	2900 lbs.	
48	2 5/8"	3200 lbs.	
54	2 7/8"	3450 lbs.	
60	3 1/4"	3750 lbs.	
66	3 1/2"	4000 lbs.	
72	3 3/4"	4250 lbs.	

"Most pipes are made by the centrifugal process, using a dry mix and rolling the concrete prior to the high speed spinning.

"In this country there are many hundreds of miles of reinforced concrete pressure pipe (made by Hume Pipe Company and ourselves.) These pipes are reinforced concrete (without steel cylinder) and are very widely used in dameters 6 to 18 in., and occasionally in sizes 24, 30 and 36 in.

"Working pressures of 100 p.s.i. are quite common and a 12 in. diameter pipe for this condition is made with 1½ in. shell. Pipes are flexibly jointed with rubber rings. They are used in all classes of ground and especially in the state of Victoria are standard practice for pressure mains.

"Two or three years ago we completed a job in New South Wales in pre-stressed reinforced concrete pipes with pressures, etc., as follows:

Diameter	Shell	Working Pressures	Test Pressures
12"	1 1/4"	Up to 325'	Up to 175 p.s.i.
20"	1 1/2"	200'	130 p.s.i.

*Consulting engineer.

"This job comprising over 6 miles of pipe, has been in service for 2 years and has functioned perfectly. Using our pre-stressing process, a number of pipes of 15 in. diameter recently tested (1½ in. wall) stood pressures ranging from 250 to 300 p.s.i. at rupture point."

Yours faithfully,
ROCLA LIMITED
F. L. FITZPATRICK,
General Manager.

Why Shell Thicknesses Are Thicker

Why are shell thicknesses of reinforced concrete pipe so much thicker, in the United States and Canada, than pipe used for the same service in Australia and other countries? Basic research by the late A. N. Talbot at the University of Illinois† from 1906 to 1908, is the reason for the "one tenth the diameter plus one inch" shell thicknesses and the high steel areas required by railroad engineers for culvert pipe. Prof. Talbot's research was sponsored by five trunk-line railroads with headquarters in Chicago, Ill.: Atchison, Topeka & Santa Fe Railway Co.; Chicago, Burlington & Quincy Railroad Co.; Chicago, Milwaukee, St. Paul & Pacific Railroad Co.; Chicago Rock Island & Pacific Railroad Co. and the Illinois Central Railroad Co. When other railroads adopted Reinforced Concrete Pipe for constructing culverts, and other drainage structures, the engineers used the same designs as those mentioned and used about the same steel areas for pipe required for two classes of loading: 2,000 pounds and 4,000 pounds on the internal projected diameter of the pipe. The formula for determining the steel areas was developed by Prof. Talbot.

The shell thicknesses for reinforced concrete sewer pipe, ranging in diameter from 24 to 108 in. were the same as required for culvert pipe but the steel areas were and are today very much less than required for culvert pipe. Before modern contractors' equipment was used in the construction of sewers and drains they were built with circular rings of brick masonry or gravity sections and later, about 1900, monolithic concrete of circular and gravity sections were often specified. In those days brick, cement and labor costs were very low and to compete, the producers of reinforced concrete pipe had to make it on or near the site of the work and utilize local labor and materials. Otherwise, they did not have a chance.

Thus the steel areas could not be so high as required for railroad culvert pipe—very little culvert pipe was used for highways in the early days—and to prove that reinforced concrete sewer pipe would sustain soil pressures in deep trenches the manufacturers made trench tests. One or more pipe were bedded in the trench and the backfill was carefully placed around and over the pipe; then weights—pig iron, sacks of cement, etc., were piled on a platform over the pipe and the end-result was that the engineers were convinced that the pipe were strong enough to stand the load in cuts to invert up to 30 ft. or more. Many of these pipe lines were carefully examined in 1929 by the writer and others and they were in excellent structural condition—as they are today. Sand-bearing tests were also made; the lower quarter was bedded in a sand box and the upper quarter loaded with pig iron and sacks of cement; the load being transmitted to the pipe by the sand in the box above it. The reinforced concrete sewer pipe sustained tremendous loads and were accepted by the engineers on that basis of testing, for the simple reason that this method of testing was indicative of the way the pipe would perform in the soil mass, through which it was constructed, when properly bedded and backfilled. Many hundreds of miles of reinforced concrete pipe sewers and drains, ranging in diameter from 24 to 108 in., were constructed in cities of the United States and Canada from 1905 to 1930, by the "field cast method" and only the trench or sand-bearing tests were required.

Reinforced concrete culvert pipe was made for railroad culverts and drains, also by the cast process, in plants in many sections of this country and Canada. Pipe were seldom tested by the trench or sand-bearing method, but they were accepted by railroad engineers on a design basis; i.e., the steel areas were designed for 2000 and 4000 pounds per square foot on the internal, projected diameter of the pipe. Talbot's formula was used almost exclusively, and the steel areas for the 1926 report of the Joint Concrete Culvert Pipe Committee were figured by Talbot's formula.

Reduce Steel Reinforcing

In the same year — 1926 — W. J. Schlick, Engineering Experiment Station, Iowa State College, Ames, Iowa, was authorized by the Joint Committee to witness the manufacture of 12 pipe in eight plants, 6 of which were reinforced with steel, designed according to the Talbot formula and 6 pipe with 50 per cent of the steel areas as determined by this formula. A total of 167 specimens, from 12 to 60 in. diam., were made and tested by Mr. Schlick about 28 days afterwards. This was done to settle an argument between two factions of the committee; that the steel areas were too high. The end result was the committee reduced the steel areas 20 per cent and these figures were carried through and included in the present Standard Specifications for Reinforced Concrete Culvert Pipe, A.S.T.M. designation C 76-41.

Joint Committee Organized

The Joint Concrete Culvert Pipe Committee was organized in 1919, and consisted of two representatives from the following: American Society for Testing Materials, Bureau of Public Roads (now the Public Roads Administration), American Society of Civil Engineers, American Association of State Highway Officials, American Railway Engineering Association, American Concrete Institute, and American Concrete Pipe Association.

G. E. WARREN was secretary until 1921, then the writer was elected

†Tests of Cast-Iron and Reinforced Concrete Culvert Pipe Bulletin No. 22, Engineering Experiment Station, University of Illinois.

A 24-in. concrete-steel pipe wound with No. 6 oil-tempered spring steel wire, made by Hume process, Lewistown Pipe Co.

when Mr. Warren resigned, and served until 1930 when the work was taken over by Committee C-13 A.S.T.M. the same year.

The first report of the committee was made in 1926, and the tests by Mr. Schlick (previously mentioned) were made. The second and final report was made in 1928, and it was adopted as standard by many railroads and highway departments in this country and Canada. Some of the state highway departments still use this specification (New York and Washington), also a number of the railroads and some of the latter have their own pipe designs—based on Talbot's formula.

In 1925 the American Concrete Institute adopted the first Tentative Specification for Reinforced Concrete Sewer Pipe, and this specification was used as a basis for the preparation of the present "Standard Specifications for Reinforced Concrete Sewer Pipe, A.S.T.M. Designation C 75-41," by Committee C-13 on concrete pipe, of the American Society for Testing Materials, from 1930 to 1941. The Second Report of the Joint Concrete Culvert Pipe Committee was used, in part, as a basis for the preparation of the present Standard Specifications for Reinforced Concrete Culvert Pipe, A.S.T.M. designation C 76-41, by Committee C-13 on Concrete Pipe of the A.S.T.M. The writer served as a member and Secretary of this committee from 1930 to 1945, and is a "producer" member at this date.

In 1912, Committee C-4 on Clay and Concrete Sewer Pipe undertook the difficult problem of preparing standard specifications for clay and concrete sewer pipe, ranging in diameters from 4 to 42 in. Up to this time, and until 1920 when the first standard specifications were adopted, all clay and concrete sewer pipe was made under manufacturers standards and the design and test requirements, if any, varied in each section of the country. Some firms produced and sold clay and concrete pipe of excellent quality and many got by with murder; the latter sold on the open market and cut the prices of those who tried to give the engineers the kind of pipe they should use on important public works. Without recognized standards, this was, and is today a difficult task in selecting pipe because some can sell anything that is round to some people—but many failures of inferior quality clay and concrete sewer pipe forced the issue and the leading engineers and manufacturers of the country took the lead in standardization.

When I attended a meeting of Committee C-4 in New York in April, 1919 the Tentative Specifications for Clay and Cement-Concrete Sewer Pipe had been in service several years, and the engineers (consumer members) wanted to advance the specifications to standard but the clay (producer) members and some of the concrete (producer) members were on the fence. As organized then, Committee C-4 consisted of 15 engineer-consumer members, 7 clay-producer members and 7 concrete-producer members. The leading engineers of the time were members: including the late Dr. Rudolph Hering, New York, N. Y.; Harrison P. Eddy, Boston, Mass.; Asa E. Phillips, Washington, D. C.; George T. Hammond, Brooklyn, N. Y.; Dean Anson Marston of Iowa State College, Ames, Iowa (Dean Marston is the only one alive today) and other top engineers. The leading clay and concrete pipe producers, and their trade associations, were members of Committee C-4. By a narrow margin, the Standard Specifications for Cement-Concrete and Clay Sewer Pipe were adopted in 1920 by the A.S.T.M. and from then to 1930 the same committee was charged with the consideration of amendments to the standards. The clay interests tried to force the inclusion of an acid test in the standards for concrete sewer pipe; failing in this, after many battles, they tried to include an acid test, as a basis of acceptance, in the clay pipe specifications. This was opposed by all the concrete producers and a number of engineers because they knew that sewage is the spent water supply of a city and its chemical reaction was and is, alkaline and not acid. The same applies to most industrial wastes. The continual wrangling in this committee over the acid test was so disgusting that many of the engineer members would not attend meetings, usually held in Atlantic City, N. J. The producer members all attended in person or by proxy and the Chairman and Secretary. On a number of occasions meetings were called and members traveled from as far west as Kansas City, Mo., and heard the secretary read the report of the previous meeting, call the roll of members, then a motion was offered for adjournment, the latter was one of the few motions, including memorials to deceased members, on which the clay and concrete members were in agreement.

In 1929 the Executive Committee of the Society was requested to appoint a committee to prepare specifications for Reinforced Concrete Sewer and Culvert Pipe and Committee C-4 was assigned the task. No progress could be made that year or in early 1930 so the Executive Committee of the Society in 1930 authorized a new committee: "C-13 on Concrete Pipe" and Committee C-4 thereafter was concerned with clay sewer pipe only.

The first A.S.T.M. Standard Specification for Reinforced Concrete Sewer Pipe was adopted in 1935 and the first Standard Specification for Reinforced Concrete Culvert Pipe was adopted in 1937. Condition surveys of existing reinforced concrete pipe sewers, ranging in diameter from 36 to 108 in., were made in 1929 and existing reinforced pipe culverts were carefully examined in 1931 under high and low fills, of railroads and highways, in many sections of the United States and Canada. Reliable test data was secured and studied by two subcommittees of Committee C-13 and all this was considered in the preparation of these two standard specifications.

In 1940, Committee C-13 made a number of editorial changes in the existing standard specifications for Concrete Sewer Pipe (C 14), Reinforced Concrete Sewer Pipe (C 75) and Reinforced Concrete Culvert Pipe (C 76). These amendments were published in the proceedings of the Society for one year and were adopted, as standard, by the Society on the recommendation of Committee C-13 in 1941. Thus each of the three specifications became known by the A.S.T.M. designations C 14-41, C 75-41 and C 76-41.

In 1938, Committee C-13 prepared a tentative specification for concrete irrigation pipe and this was advanced to standard in 1939 and became known as Standard Specifications for Concrete Irrigation Pipe, A.S.T.M. designation C 118-39. This is the most rigid specification the committee prepared because the thin-shell, non-reinforced pipe is required to meet tests for external loading, absorption and must withstand, without leakage, very high internal hydrostatic pressure tests.

This account of the procedure in the preparation of standards for the several classes of concrete pipe will show the uninitiated that much time and effort, by the leading engineers and manufacturers, was expended in their development. And the wide use of concrete pipe today, and especially since 1920, is due to A.S.T.M. Standard Specifications.

The standard specification, which Mr. Fitzpatrick mentions and quotes, in part, is Australian Standard Specification for Concrete Drainage Pipes (Pre-Cast)—Technical Standard No. A 35—1937. It was prepared by the Australian Commonwealth Engineering Standards Association, founded in 1922. The design and test requirements were based, as they were in this country, on practical experience with concrete pipe, of the several classes, in that country. The thin shells permitted were, in my opinion, based on the early development of reinforced concrete pipe, with and without steel cylinders, in France from 1887 to 1900.

The principal mistake in both the American and Australian specifications is the 3-edge test requirements for reinforced concrete pipe in the diameters 48 to 72 in. From 1930 to 1940 I tried to convince the members of Committee C-13 that it was a mistake, and unfair to the user, to require 3-edge tests for reinforced concrete pipe in diameters greater than

(Continued on page 162)

Production Line Block Manufacture

North End Materials Co., Kenmore, Wash., employs pumice as concrete aggregate

By WALTER B. LENHART

One air valve, to the right, serves to compress, vibrate, and strip concrete block from pneumatic block machine. Magnesium pallets are used. Note off-bearer device used by workman, to the left, in transferring finished block to roller conveyor

DURING June, 1946, the North End Materials Co. placed in operation a block plant at Kenmore, Wash., one of the many small, fast-growing communities north of Seattle. It is near the north end of Lake Washington. The owners are G. A. Dike, president; G. C. Granger, vice-president; and L. E. Thomas, vice-president in charge of sales. These three young men, who also own the Western Sales and Mfg. Co., Seattle, Wash., built the block plant with the primary purpose of demonstrating their new concrete block machine now placed on the market. The block manufacturing equipment in the plant now consists of a Western 8- x 8- x 16-in. pneumatic machine and a double 8- x 6- x 12-in. standard Western pneumatic machine. This type of machine uses air for all operations; agitation, compression and stripping. B&W Brick and Materials Co., Chicago, is national distributor for the machine.

Plant layout is simple and inexpensive. Trucks dump directly into the 30-cu. yd. aggregate receiving bin. Sacked cement is used. All of the plant's output has been two types of pumice brick; one is water-proofed and the other is without waterproofing. Material drops by gravity to a 14-cu. ft. weighing hopper ahead of the Western tub-type mixer of same capacity.

Use Magnesium Pallets

One novel feature is the use of magnesium pallets. These are purchased from the Pullman Northwest Co., Pullman, Wash., and cost about 85¢ each. The magnesium used for casting is from surplus war stocks. Magnesium makes an excellent pallet as it is about one-half the weight of aluminum and has surprising strength. A pallet for an 8- x 8- x 16-in. block weighs 1 lb. 3 oz.

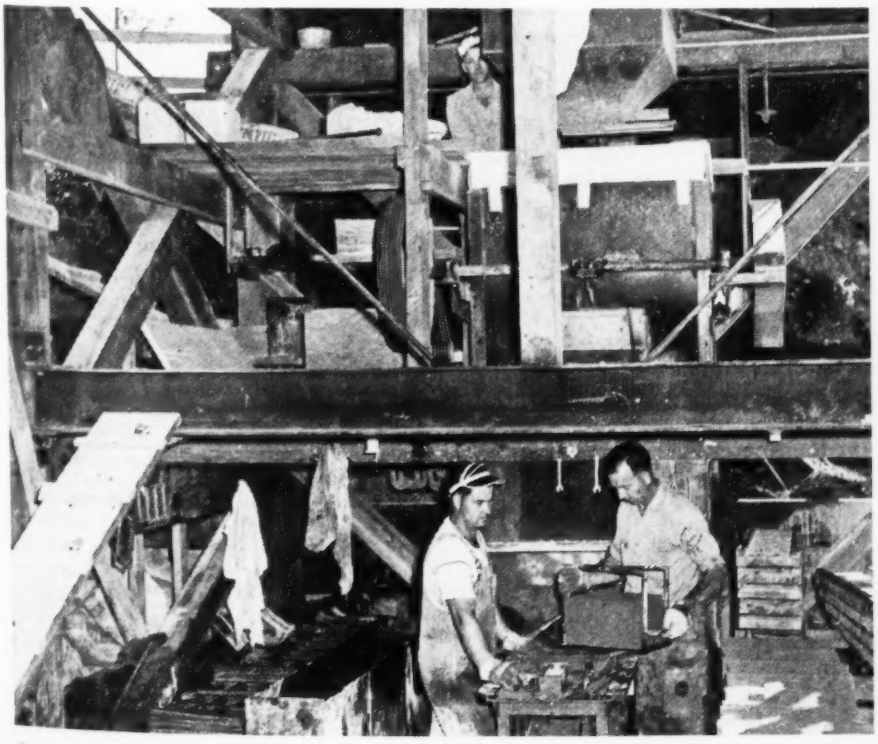
Stripped blocks are placed on gravity rolls for delivery to racks in the yard. The blocks stay on the racks 24 hours and are then stored for final curing. A steam room for curing was recently constructed.

The two air brick machines obtain air from a Wilmington 4-cylinder air compressor. About 25 cu. ft. of air per minute is used by each machine. The 14 cu. ft. mixer uses a 10-hp. motor, it is provided with Fafnir self-aligning bearings, and is driven through five "V" belts.

The plant has a capacity of 1500 to 1600 of the 8- x 8- x 16-in, block and 2500 to 3000 of the 8- x 6- x 12-in. block per shift.

Pumice block and brick are very popular in the Northwest as they can be nailed, sawed, or bored with ordinary carpenter tools. It does not sweat. While its load bearing capacity is not great, it can be used for load bearing walls on dwellings up to and including two stories high without any trouble. On higher structures it is used for backing up concrete walls as it has high fire resisting qualities, it is sound and vermin proof, and is an excellent insulator of heat and sound.

At the North End Materials Co. plant, pumice is secured from Bend, Ore. It is all minus ¼-in. The ordinary mix uses 1 part portland cement, 7 parts pumice and 3 ounces of Darex for water-proofing. For higher strength materials in the above mix, sand is sometimes added up to 30 per cent of the cement used, or, additional cement can be used.



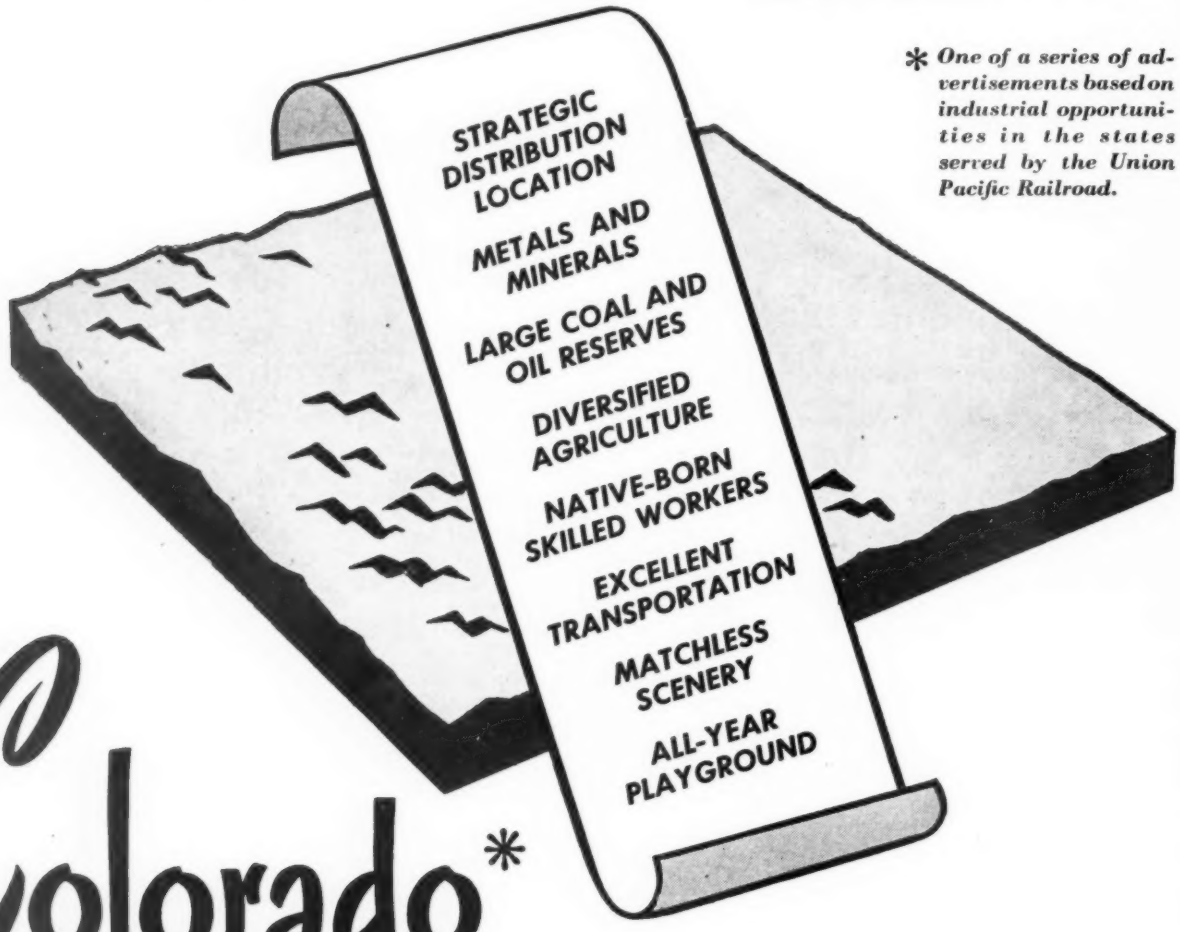
Plant layout using pneumatic block machine. Above may be seen mixer mounted under batcher

BAXTER CONCRETE BLOCK WORKS, Baxter, Tenn., owned and operated by J. T. Dunavin and C. O. Maxwell, has started producing concrete block.

UNION PACIFIC

TREASURE MAP OF INDUSTRY

* *One of a series of advertisements based on industrial opportunities in the states served by the Union Pacific Railroad.*



Colorado*

Colorado offers industry many desirable sites for manufacture, distribution, warehousing, and other purposes. It is strategically located for national distribution.

Diversified agricultural products are of high quality due to favorable climate and soil.

More than 250 useful metallic and non-metallic minerals and compounds have been found, including precious uranium. Timber, oil and coal are practically unlimited.

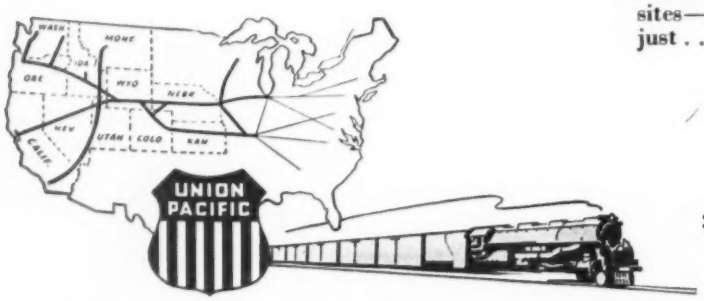
Native-born skilled labor, and a healthful climate resulting in fewer "time-outs" assure economical production.

Colorado provides sound state economy, modern educational and cultural facilities.

Thousands of vacationists enjoy its mountainous splendor, cool summer breezes and winter sports.

Union Pacific provides Colorado with unexcelled freight and passenger transportation. Every night, over night Streamliner service between Denver-Chicago . . . Denver-St. Louis.

For assistance in securing industrial and commercial sites—and for all-weather, dependable rail service, just . . .



be Specific – say "Union Pacific"

* *Address Industrial Department, Union Pacific Railroad, Omaha 2, Nebraska, for information regarding industrial sites.*

UNION PACIFIC RAILROAD

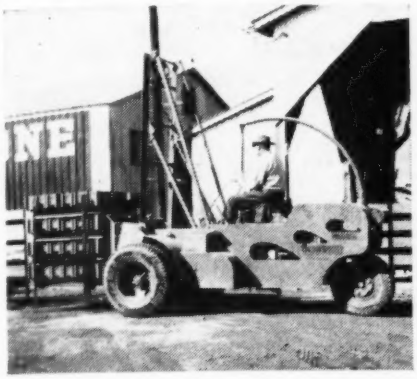
THE STRATEGIC MIDDLE ROUTE

Pumice Block

(Continued from page 145)

turned to any desired position by the machine operator.

For hauling the brick to the storage yard, a two-pronged, gasoline engine



E. H. Judd, manager, at the controls, demonstrating how block are handled to outside storage by lift truck

driven, Scoopmobile made by the Mixermobile Co., is used. It is a rugged piece of equipment, rubber mounted and does not need a paved storage area as it works excellently on a plain gravelled surface.

The plant is located on Commercial Road in San Carlos, just North of Redwood City in the South Bay section. The plant is served by Southern Pacific Railroad Co.'s tracks. Frank C. Dillard, Portland, Ore., is president of the company, and co-owner with Mr. Judd.

Batching Controls

(Continued from page 151)

outlet so as to resemble an elongated "U." It is 420 ft. long.

Immediately under the steel bins is the Johnson batcher with Kron dial scales. The batcher can discharge to either of two 4-cu. yd. Koehring wet mixers or, if dry batched, the mix can pass to the batch compartment trucks. The two 4-cu. yd. wet mixers are mounted opposite each other with the entire assembly resembling the set-up used at Shasta and/or Friant dams except in the latter plants four mixers were used. The company fleet of 16 mixer trucks is comprised about equally between Smith, Jaeger, and Rex equipment.

D. W. Kelly is president of the Arizona Sand and Rock Co., and H. B. McIntosh is engineer.

Cuts Block Prices

CONCRETE PRODUCTS Co., New Philadelphia, Ohio, recently announced a reduction in price of concrete block of 12½ per cent or to 16¢ a standard 8- x 8- x 16-in. block, delivered. This price reduction was made in accordance with the so-called "Newburyport plan."

JOHNSON AND IDLAND owners and operators of a concrete products plant in Clarksfield, Minn., are again producing concrete block.

Concrete Mix Design

(Continued from page 153)

Let W = weight of aggregate sample and w = weight of same sample when reduced to saturated, surface dry condition. Then per cent moisture = $\frac{W - w}{w}$. Suppose moisture = 1 per cent, and W = 1500. Then $\frac{1500 - w}{w} = .01$ $w = \frac{1500}{1.01} =$ 1485.149. Hence reduction in weight of aggregate in sample, below standard weight due to presence of 1 per cent moisture = 1500 — 1485.149 = 14.851. Weight of water of equal volume to 14.851 grams of aggregate = $\frac{14.851}{2.65}$ = 5.604 gr. Net loss in weight for 1 per cent moisture = 14.851 — 5.604 = 9.247 gr. Hence, a reduction of 9.247 grams in the weight of the pycnometer containing 1500 grams of damp aggregate of specific gravity of 2.65 below the weight of the sample is 1500 gr. Saturated Surface Dry Aggregate means that the aggregate sample contains 1 per cent of free moisture.

Using the same procedure, except that the denominator of 1.01 in the equation $w = \frac{1500}{1.01}$ is changed to 1.02, 1.03 etc., a scale showing percentage of moisture to correspond with grams loss in weight can be built up. Fig. 2 shows such a scale for Sp. G. 2.65. Theoretically there should be a different scale for each point change in Sp. G. However, the differences are so slight within the ranges usually found in concrete aggregate that the same scale can safely be used for any aggregates between 2.60 and 2.70.

There are many advantages to automatic moisture compensation in the ready mixed concrete plant. Due to the very great number of changes in batch weights being made constantly, different mixes and different sized batches, there is great danger that, in the hurry of keeping trucks moving, necessary compensations may sometimes be overlooked or made incorrectly.

The basic principle of automatic compensation is that the counterpoise is set at the saturated, surface dry weight desired, and the additional weight of water is taken care of by manual adjustment, requiring no computations. As many compensating beams as there are aggregates which require compensation are necessary. All sands, and the two smaller sizes of coarse aggregate will require compensation. Aggregate held on the 1-in. screen and larger usually does not carry enough moisture to require compensation. Three or four compensating beams will usually suffice. Any good scale mechanic can modify the usual good weighing apparatus at present installed in a plant to give automatic compensation.

There are, of course, two parts to automatic compensation; adding the weight of surface moisture to the weight of the aggregate, and then deducting the same weight from the added mixing water. This is accomplished by having all aggregates requiring compensation and the water weighed on the same scale. A tank welded on the aggregate weigh hopper is a very convenient way of accomplishing this. The weight of water required in the water tank to complete the batch is automatically set by manipulation of the compensating scale beams already used.

The advantages of this type of operation are instantly apparent. With this the mix can be designed for the exact weights of saturated surface dry aggregate and total mixing water, and the weigh beams can be set for these weights — both aggregates and water. Then the only thing necessary to control the total mixing water is to keep constant check on the moisture by means of the moisture meter. It will be found that the above described moisture meter is so simple that any weighman can operate it just as accurately as the technician or engineer. In cases where the moisture content is changing rapidly; e.g., when live steam is used for heating, it may be necessary to have additional help when production is heavy. Under ordinary conditions, however, the weighman becomes the concrete technician as far as compensation and overall proportions control is concerned.

Various refinements can be made which will further speed operations and further remove the human equation. One of the most satisfactory is automatic shut-off on the water supply line. The weighman opens the valve, but an electrical contact on the scale when the water is being weighed first automatically shuts the valve to a dribble position, and then completely cuts off at the exact weight required.

In the apparatus outlined above, cement may be weighed on the same or on a different scale. If an automatic record is to be made of the weights, it may be desirable to have the cement on the same scale. On the other hand, batching will be speeded if a separate scale is used for the cement. A separate scale can also be used for the large aggregate which does not require compensation.

Standard Measures, Mixing Pans, Tamping Rods, Platform Scale

Standard volume measures of 1-cu. ft., ½-cu. ft., and 1/10-cu. ft. should be in every control laboratory. They are essential for determining optimum proportions, unit weight, etc. Mixing pans, including one large shallow pan (at least 3 ft. square and 3 in. deep, larger if possible) should be available. The tamping rod is merely a solid bar of ¾-in. or ⅝-in. steel ground to a bullet point. The plat-

form scale should have capacity of at least 200 lbs.

Testing Apparatus

Constant tests of the concrete as made are essential for continued adequate control. Arrangements can often be made with a commercial testing laboratory, but for the plant or job where there is sizeable production, a well equipped laboratory will be found a most valuable investment.

Testing Machine

The central piece of equipment in such a laboratory is the compression testing machine. While other tests may be necessary for special jobs, compressive strength is in general the most important test made on concrete and usually gives the most reliable information.

If available, a screw or hydraulic motor driven testing machine having at least 200,000 lbs. capacity should be used, to meet ASTM standards. These machines are expensive and very heavy, however, and therefore not always available or suitable. A machine which gives very satisfactory results, and is very close to standard, is found in the hand operated hydraulic compression machine equipped with a high grade pressure indicator. The ordinary gage with which these machines are usually equipped is not accurate enough for concrete testing. Gages are made, however, which do give results satisfactory under practically all conditions.

Cylinder Molds

At least one dozen cylinder molds are usually necessary in a plant or job laboratory. The molds can be made of almost any non-absorbent material stiff enough to hold its shape. Cardboard molds are often used, but their expense becomes a considerable item if many cylinders are made, and storage is a nuisance. A very satisfactory mold can be made by having heavy galvanized iron rolled into cylindrical form 6 in. in diameter and 12 in. high. A narrow strip welded down one edge of this mold and projecting forms a shoulder into which the other edge fits snugly and securely when the mold is drawn together. Various types of bands may be used for holding the mold in place. Perhaps as convenient as any is a piece of baling or similar soft wire which is twisted tight and then discarded.

Curing

There is always sufficient water in the ordinary concrete as used in the plant or on the job to completely hydrate the cement if it is not allowed to evaporate. A very convenient method of curing in the laboratory of moderate size is to dip the test specimen in hot paraffin for about a minute, sufficient to get penetration, and then store in a constant temperature cabinet. One of these can be made from insulating material and equipped

(Continued on page 162)

Concrete Mix Design

(Continued from page 161)

with a thermostat controlled electric heating unit. Tests show practically no loss of weight in the parafined cylinders, hence adequate moisture remains for complete hydration.

Capping

In order to get accurate results from compression tests, it is essential that the ends of test cylinders be true planes. This is difficult to get with apparatus available on the job or in the ordinary plant laboratory. The most satisfactory method in the writer's experience is the shot capping method. This consists of two shallow straight sided saucers or caps of heavy machined metal into which is placed a bed of chilled steel shot or small ball bearings. One cap is laid on the table with the shot in place and the cylinder is placed in it. The cap is then fastened to the cylinder by set screws through lugs projecting above the edge of the cap. The inside diameter of the cap is just slightly larger than the diameter of the test cylinder—the fit is close enough so the shot will not roll out between the cylinder and the wall of the cap. The cylinder is then reversed and the other end capped. When a cylinder so capped is tested, the shot adjust themselves to any irregularities in the surface or plane of the ends of the cylinder, thus giving practically uniform pressure over the entire surface. Full description of the shot capping method will be found in the United States Bureau of Reclamation Manual.

Accelerated Strength Testing Apparatus

This apparatus is frequently of use in giving accelerated test results on proposed mixes when the answer is required before the end of 28 days. It consists of equipment in which the test cylinder is held at 212 deg. F. under standard conditions for a few hours. Full description of this apparatus will also be found in the above Manual.

Pipe Tests

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48 in., and was only able to block 3-edge tests for the diameters 78 to 108 in. Several of the producer members had engaged in the manufacture of machine-tamped and centrifugal reinforced concrete pipe in diameters up to 72 in. and were under the delusion that they could put the producers of cast pipe out of business. The 3-edge tests of cast pipe, in the larger diameters, were much lower than those of machine-tamped and centrifugal pipe. The excellent performance of the cast pipe in service in this country since 1905 made little impression on these manufacturers, and they and some of the engineer members of Committee C-13 favored 3-edge testing because it was less expensive. When vibration was introduced the manufacturers of vibro-cast reinforced concrete pipe were all set to hold their market and went along on 3-edge testing. But what few understood was that they were exposing their "under-belly" to the competition of corrugated metal pipe, vigorously promoted by the steel companies and with unlimited funds you can sell anything — even pipe made of poor quality lumber (this was done from 1940 to 1942 and proved a flop).

For the last decade or more, the manufacturers of reinforced concrete culvert pipe, and to a less extent sewer pipe, have to compete, on an equal price basis, with light gage corrugated metal pipe on important work. No tests for external loading are or can be required for corrugated metal pipe for the simple reason that it has little if any inherent structural strength and depends for structural stability on the care exercised in bedding and back-filling in a compacted soil mass. But in time this will be overcome because metal pipe has a limited life expectancy in active waters and many types of soils.

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SERAPHIN LAPIERRE and his sons have purchased equipment and are manufacturing concrete block at Helena, Mont. Capacity of the plant is 1500 block per day.

MILLER MFG. CO., Talcott, W. Va., has started the manufacture of concrete block. Delbert Miller is the owner of the plant.

New Block Plants

HAYES AND MCDONALD CO., Aberdeen, Wash., is producing concrete block, soil pipe and miscellaneous concrete products at its new plant. The company is a partnership of Ralph Hayes, World War I and II veteran, and A. McDonald, former mayor of Westport. Mr. McDonald has had many years experience in the industry.

GILMORE, INC., is soon to start operations in a new concrete block and drainage pipe factory in St. Albans, Vt. Plans call for daily production of 2400 concrete block and 1000 feet drainage pipe. Block machinery was installed by Roy Darden Industries.

AMHERST BLOCK CO. has started operations in rented space in the basement of the Universal Calcium Co., Amherst, Minn. The new plant is owned by Nels Westergaard and Kelly Nash of Minneapolis. About 500 concrete block and 700 brick are the present daily capacity, but plans for expansion are already drawn up.

CARL H. PERSON, East Minneapolis, Minn., has started work on a plant and office building for his own concrete manufacturing business. He was formerly associated for 22 years with Crown Sidewalk and Block Co.

OCEANLAKE BRICK AND TILE CO., incorporated for $10,000, has started construction of plant and offices near Oceanlake, Ore. The company was organized by Z. K. Smith, L. Denzil, W. Love and H. S. Rood. The plant is scheduled for completion soon, with a daily output of 8000 concrete block expected.

JOHNSON AND BENSON, Stevens Point, Wis., plan to erect a new building to house their concrete block business in the near future.

VICTOR MICA CO. is starting operation of a concrete block plant near Spruce Pine, N. C. The plant will specialize in heavy aggregate blocks, using no slag or cinders.

CARL AND ROBERT REGAN, New Richmond, Ohio, will soon move their concrete block plant to a large building recently vacated by American Brake Shoe Co. The operation was begun less than a year ago in a tent, but has expanded so rapidly that the brothers

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are still unable to meet demand. This summer they expect to add cinder block to their line of regular concrete block.

STANDARD CEMENT PRODUCTS CO., Grand Coulee, Wash., which has operated under the partnership of Andrew Seresun and H. H. Buchholz, will continue under the name of Seresun's Cement Products Co. Mr. Seresun has purchased his partner's interest and assumes full control of the business.

JOHN L. HURST has disposed of his interests in the Hurst Construction Co. and an asphalt plant in Marietta, Ohio, and has moved to Fort Lauderdale, Fla., where he plans to go into a building material business. Shelly & Sands, Inc., are the new owners of the Hurst company.

PAUL EMBRY AND JOSEPH R. FOLIO, veterans, have started a concrete block plant in Clarksburg, W. Va. Capacity of the plant is 1500 block per day.

MONTICELLO CONCRETE PRODUCTS Co. recently began operation at the site of an abandoned marl drying plant in Monticello, Minn. Block machines used are of Ford Block Machine Co. design.

EDGAR ERICKSON recently entered the concrete block business in Durand, Minn.

I. W. SMITH has started a concrete products business in Fort Frances, Minn., where his new plant is expected to turn out Dunstone, Dunbrick and Korpak concrete blocks. Smith has been affiliated with a local contracting firm since 1924.

CENTERVILLE INSULATED BLOCK CO., Centerville, S. D., is expected to turn out 2000 block per day, according to Roy Robbins, manager of the new enterprise.

SUNBURST BRIKCRETE CO., Sunburst, Mont., has been organized by J. R. Gallup and Norbert Sindon to produce building brick of both concrete and tile.

GLENWOOD CEMENT PRODUCTS CO., a joint venture of Art Johnson and Art Hitman, has a daily capacity of about 1500 block. It is planned to step up production as demand in the Glenwood, Minn., area increases.

BUILDER'S CO., Madison, Wis., has started operation of a new plant that has a varied output in addition to concrete block. Other items manufactured include concrete floor and roof slats and ready-to-mix concrete. The recently formed company lists capital stock at $300,000, and was incorporated by V. H. Peterson, F. C. Mc Anulty and Ross Patterson. The expected plant capacity is 40,000 block per day.

New Incorporations

DU BOIS CONCRETE PRODUCTS CORP., N. Y., has been incorporated with a capital of 1300 shares. Louis J. Damaro is the principal.

CALDWELL CINDER BLOCK CO., INC., Lenoir, N. C., has been authorized to issue capital stock worth $10,000. Subscribed stock, $300, by Carl and Louise Long, of Fries, Va.; and J. D. Lindsey, Lenoir.

WHITMERS CONCRETE PRODUCTS CO., Fifield, Wis., has incorporated with 500 shares at no par value. The new company will manufacture and deal in block, tile, stone, sand and gravel, plus building materials and supplies. Dee Whitmer and Hy Metz are principals, with J. W. Whitmer as attorney.

CONCRETE PRODUCTS CO. OF GREENVILLE, Greenville, N. C., has been authorized to issue stock valued at $100,000. Subscribed stock of $300 has been issued to F. M. Wooten, Jr., M. P. Moore, and W. D. McArthur, all of Greenville.

JOHNSON CONCRETE CO., Salisbury, N. C., authorized to issue capital stock of $200,000 valuation, to deal in concrete structural products. A. S. Johnson and K. W. Johnson, both of Lexington; and F. H. Johnson, Salisbury, are the principals.

WESTERN READY-MIXED CO., Quincy, Ill., has been authorized to issue 10,000 shares of no par value stock. Investors: F. Orville Flaiz, J. T. Fierke and H. H. Calander.

VETERANS CONCRETE PRODUCTS CO., Two Harbors, Minn., has recently been isued a certificate of incorporation. In addition to manufacture of concrete products, the new firm will also job building materials. M. W. Edlund, Two Harbors; and J. W. Corcoran and Ralph Hanson, Duluth, are the principals.